Cabinet Prifddinas Ranbarth Caerdydd | Cardiff Capital Region Cabinet

15 JULY 2019

REPORT ON DIGITAL INTERVENTIONS IN CARDIFF CAPITAL REGION

REPORT OF CCR CITY DEAL DIRECTOR

AGENDA ITEM: 8

Reason for this Report

1. To update Regional Cabinet on developments with and changes to, the package of digital proposals previously agreed as a focus for business case development under the 'Digital Strategy' banner. This includes proposed changes to the configuration of the Local Full Fibre Network (Wave 2) bid and combining both elements, proposes a clear way forward for the role of digital and technology in CCR City Deal.

Background

2. In February 2018 a package of potential proposals was submitted to Regional Cabinet. The report, entitled 'Digital Strategy', set out a range of proposed interventions for possible City Deal investment – subject to business case development. These were: Global Connectivity, Welsh Connectivity, Regional Connectivity, Community Fibre Connectivity, and Regional/Community Wi-Fi, Mobile 5G Access, Sensing CCRCD and Open Data.

3. In the time elapsed, a strong view has been articulated that the digital strategy is predicated on an infrastructure plan. Whilst this is important because infrastructure is a bedrock - by itself it is not enough and must be amplified and built upon. However, in the context of the cross-cutting 'cluster' approach identified in the Industrial and Economic Growth – it is likely that a single sector focussed 'digital strategy' will have limited currency. Instead, and as is the aim of the Growth Plan and Investment Framework – the whole economic development approach needs to underpinned, enabled and supported by digital in order to:

- convert good research and ideas into uses, applications and businesses;
- ensure our economy is more productive and competitive through infrastructure and innovation;
- back and support priority sectors, clusters and eco-systems;
- shape skills and talent development that doesn't just get people into work but enables progression in that work;
- drive a sustainable and resilient future for public services;
- stimulate and leverage commercial investment in the region;
- adjust to competitive evolution that is no longer linear – but exponential and disruptive.

4. This proposed refocus is not about digital itself being the 'competitive advantage' – but recognising that unless digital is embedded in all our efforts to grow productivity, competitiveness and prosperity – we will be at a competitive *disadvantage*. In a digital world, the goal must be to capture the enabling and underpinning value – across all sections and sectors of the economy. Digitisation will not just help provide future jobs, it continues to transform all jobs. Businesses can innovate and get ahead through technology. It is the means and not the end. There is broad and proven recognition that the provision of digital services drives economic growth and enables social inclusion and cohesion. We must work across the economy, industry and public services to develop and consolidate structural foundations, to encourage investment and guide innovators as they enter the market.

The work to date on a 'Full Fibre Future'

5. The work commissioned and carried out to date by CCR appointed advisors has been important and of high-value. The plan for infrastructure development prepared by the advisors has been endorsed and accepted by all key stakeholders spanning the market and Welsh Government (WG). Their assessments are spot-on. It has underscored the necessity for a full-fibre backhaul, highlighted that without a plan we are headed for a 'digital desert' and reinforced that issues of inequity prevail with much of the infrastructure development being public sector focussed. The work, including that to inform delivery of LFFN, has also highlighted the fragmented and disparate approach adopted in the region across CCR and WG.

6. The work done by the advisors, at concept level, in terms of the infrastructure and investment needed – stands firm. CCR's 'The Digital Network' draft Outline Business Case is attached at Appendix 1.

7. However, to progress matters, there are two proposed variations to the original plan:

Local Full Fibre Network (LFFN) Bid Wave 2

8. The original approved LFFN bid for Wave 2 cannot proceed as planned. The purpose of the bid - using the public estate (in particular schools) to act as a catalyst for fibre investment in the key economic development areas of the four areas identified (Blaenau Gwent, Torfaen, Monmouthshire and Newport) is problematic. The bid has been the subject of ongoing discussion with DCMS and WG for an extended period. It is clear that the current conditions are not conducive to proceeding in the way originally envisaged – a view shared by all. Not only would it potentially conflict with investments in the Public Sector Broadband Aggregation (PSBA) network; it would come ahead of a planned review of PSBA that Wales Government is commencing in advance of the cessation of the current PSBA contract term. Hence, it would be unwise to invest in infrastructure that the PSBA does not wish to utilise in the short term and so the investment plan needs to be re-prioritised. In addition, in the light of the prolonged period of negotiation, the timescale remaining will not now support the original course of action.

9. The alternative course of action (agreeable to both DCMS and WG) is a more straightforward and whole-region proposal. This is to replace the PSBA copper circuits **across all ten areas** with full fibre circuits (similar to a model supported in North Wales and in fact part of the approach that CCR proposed to DCMS as part of its LFFN Wave 3 bid). The way this would work is for PSBA to identify a list of public sites receiving a copper service. DCMS would invest in the capital works associated with replacing those circuits with full fibre. The fibre brings with it an ability for the surrounding homes and businesses to connect through full fibre by separate intervention. The speed and simplicity of this approach is favoured. All circuits are ordered via PSBA; there is no procurement process and so could be accommodated within a short timeframe, meaning the project would remain on target to draw down the originally agreed sum of £6-7m (with potential for additional funding should it be required). The resultant revenue position is cost neutral as copper is about the same cost on fibre and sometimes less expensive.

10. Homes and businesses then could potentially benefit through fibre acceleration. When deploying the public sector site circuit an additional piece of infrastructure is deployed that enables a local full fibre network to be plugged in to it. This does of course require additional investment. However, the investment threshold for those homes and businesses is significantly reduced making any additional scheme, whether private or public led, more affordable and viable. CCRCD effort could focus on such schemes stimulating connectivity from the

public funded nodes established. A draft of the revised DCMS LFFN Wave 2 submission is attached at Appendix 2.

Investment in infrastructure and one shared plan for the region

11. The second change is linked to LFFN and the bigger picture of fibre provision in the region. Seen in isolation, the proposed revised LFFN bid is sub-optimal. It will not directly benefit businesses – and requires secondary separate interventions to do so. However, this is where the leverage lies for CCR. In moving away from the LFFN original bid, there has to be some further advantage and it is agreed that this lies in agreeing a shared bigger picture plan for digital infrastructure provision in the CCR with WG.

12. The work done to date and recommendations are critical to this. The difference in emphasis however, given the re-focussing of the LFFN bid, is that the work completed should now inform one shared plan and business case for the region – owned by both CCR and WG. The second difference is, given the joining of efforts in this way, there is no major call on City Deal resources as 'outlay' – as per original assumptions.

13. There is agreement across partners, including WG, DCMS and private providers that the broadband market is a crowded space in commercial areas. The clear view expressed by stakeholders, is that there is no shortage of investment and no overall requirement for City Deal to outlay major funds. Rural connectivity remains a challenge but this is best addressed by UK and Welsh Government initiatives. There is also recognition from WG that in altering the course of the planned LFFN bid, there needs to be an 'offer' back to CCR and that offer needs to include eventual realisation of wider and more strategic goals. PSBA is currently a barrier to this and so it is agreed that CCR will inform the PSBA review focussing on addressing issues of cost; single-use and single purpose and the need for opening up provision. The Deputy Minister for Economy & Transport has been engaged in this conversation and is kick-starting the review.

14. The offer for is to address digital infrastructure issues and challenges in the region, in a joined-up way. Whilst the outcome on LFFN is less than ideal, positioned in this more comprehensive way, it can provide a whole region foundation on which to work with WG to co-develop the next stages and layers of the wider plan. This will include:

    - one agreed digital infrastructure plan for region which can be jointly owned and presented to external bodies like DCMS. This will arrest 'competition', align objectives and develop a shared understanding around activity, how it is best convened and co-ordinated and what remains to be done;

- shared approach to establishing market and industry intelligence and insights. What are the big problems to be solved to effect the right kind of economic impact, in line with priorities and sector and place-based growth? This will identify ways in which current digital infrastructure is a barrier to growth;
- WG-led review of PSBA, which CCR can inform and shape to address the current deficiencies and shortcomings – as described above; and,
- a joint investment plan to make it happen.

15. As stated above, a targeted joint investment plan will no longer be predicated on direct City Deal grant funds or outlay. There are high levels of confidence across all partners and sectors that the money is out there – the issue is directing, co-ordinating and aligning it to best effect. The joint investment plan will therefore be about blending:

- DCMS Rural Gigabit Connectivity Fund - £200m first phase of bigger scheme;
- the remaining £60m of Superfast Cymru 2 (take up to date has only been in the order of £20m);
- private providers – for example, the plans for CCR being developed by Next Generation Access;
- leveraging the Trunk Road concession agreements;
- a bridge fund to target remaining gaps established jointly by WG and CCR.

16. Evidence from market engagement demonstrates that there is a strong willingness to develop full fibre in the CCR. Whilst the funding streams above can go some way to achieving this – all parties have stated that given the demand-driven model, any further requirement could be addressed through an investment case. There is no expectation of outlay or subsidy – discussions with both WG and CCR have been predicated on repayable bridge loans, Joint Venture and revolving ROI models – money in rather than money out. Should gaps remain in the shared plan, or there be a desire to amplify or accelerate certain areas or sectors, investment could be made through the establishment of a joint fund – through the CCR Infrastructure Fund – as above. It also sets the revised LFFN bid in proper context – laying the foundations and providing the baseline across the whole of the region on which one future-proofed investment-led plan. This is a strategic use of the public estate and driving business and economic delivery and providing closer points of proximity to address domestic and community-level issues.

17. In summary, the work completed to-date reinforces that the ‘why’ and the ‘what’ remains valid and viable. It is the ‘how’ that must change. In addition, there is a need to focus on the market intelligence needed to drive the roll-out of the

approach described in order to tackle the issues based on place, priority sectors and skills for the future. Currently we do not understand the opportunity cost to sectors and businesses and the impact on factors such as R&D. This work must happen quickly and will be carried out across CCR and WG. This means our role in relation to digital infrastructure is less about direct provision and more about setting context for regional economic development – co-ordinating and aligning investment to plan and fillings gaps through a shared investment model to drive local and regional schemes.

18. There are issues to be resolved in this, namely the lead for the LFFN project now it is proposed to be region-wide. It is suggested that this becomes the City Deal Office. In addition to this, the costs relating to the work to date on the LFFN scheme will need to be covered on a whole region-basis via the City Deal Wider Investment Fund project delivery budget. To date, this amounts to £91k and further anticipated costs of £15k.

19. The approach proposed also works in conjunction with the forthcoming Investment & Opportunity Prospectus. This is beginning to build up a picture of the CCR offer – broadband; sustainable transport, sites and premises, housing zones and the skills offer. The other opportunity in this regard is to explore with Transport for Wales the use of Metro stations as potential anchor fibre providers. There are high levels of fibre connectivity attached to Metro and dual capacity fibre within the core valleys lines as well as throughout the Command Centre in Taff's Well.

20. The wider opportunity around digital is to develop beyond the infrastructure part of the plan. The ROI focus on the Infrastructure Plan leaves room for other digital projects and schemes to bid into the Investment Framework. To guide this and ensure the schemes are ones which align with priorities, the Investment and Opportunity Prospectus will place an emphasis on encouraging the schemes that fit with CCR ambition and priorities, filling gaps and providing new opportunities to boost priority sectors; bring research and ideas to life, boost productivity through innovation and Research and Development and build future skills and talent as well as focus on digital future public services.

Reasons for Recommendations

21. The reasons for the recommendations are:
    - in the intervening period, from the first 'digital strategy' report, the context, challenges and opportunities have changed significantly. This report reflects that new positioning and offers a way forward in resolving outstanding issues; provides a proposed course of action around LFFN to fit into this and further develops the wider and richer digital picture for the CCR.

Financial Implications

22. At its meeting of the 12th February 2018, Regional Cabinet approved the Digital Strategy report, along with a budget of £100,000 to prepare an Outline Business Case, including Procurement Support, and associated Branding and Marketing expertise. A further budget of £30,000 was approved to support the ongoing work of the Open Data Working Group.

23. It is understood that the actual costs incurred against these budgets amount to £83,000 resulting in £47,000 of resources being available to fund the re-positioned way forward on digital and technology, including the revised DCMS LFFN Wave 2 bid.

24. The report outlines that costs amounting to £91,000 has been incurred by Newport Council on behalf of the LFFN 2 local authorities and that further costs, estimated to be in the region of around £15,000 will be required to finalise the revised bid. This results in a potential shortfall of £59,000 and can be met from the Wider Investment Fund – Programme Development & Support budget.

25. The report provides a high-level overview of the financial implications that may be associated with the revised bid, namely that;

    - the capital outlay (£6M - £7M) can be fully funded within the DCMS grant allocation;
    - the bid is anticipated to revenue neutral to those public sites that will host services;
    - City Deal Office will need to put in place a level of resource to deliver the project and mobilise operations through the resourcing of the new City Deal office structure – agreed by Cabinet in February 2019.

26. There will be a need for ongoing discussions with Welsh Government to ensure that CCRCD funding is aligned with Welsh Government investment proposals and to minimise the risk of any overlap and duplication, resulting in potential abortive costs crystallising. Instead, the proposed collaborative approach seeks to maximise the use of the public estate, drive business and economic delivery and provide an investment return in-line with the principles of the Investment & Intervention Framework.

27. A draft of the revised DCMS LFFN Wave 2 bid is attached at Appendix 2 and the Recommendations seek approval to delegate authority to the City Deal Director (in consultation with the Portfolio Member and Joint Committee s151 Officer) to finalise the bid within the parameters outlined above. In addition, the bid will need to ensure that it fully complies with the requirements of CCRCD Assurance Framework, as this is a key condition of the funding Terms & Conditions.

28. An update report will need to be brought back to Regional Cabinet to advise on progress in due course.

Legal Implications

29. In finalising the bid proposed detailed legal advice should be sought to ensure all bid conditions can be met within legal constraints and the provision of the JWA, which includes the Assurance Framework.

30. The body of the report refers to placing reliance on a procurement arrangement put in place by WG referred to as PSBA. Before any order is placed it will need to be confirmed that the PSBA arrangement can be relied upon by CCRCD and that such way forward meets procurement law requirements.

Wellbeing of Future Generations

31. The Well-Being of Future Generations (Wales) Act 2015 ('the Act') is about improving the social, economic, environmental and cultural well-being of Wales. The Act places a 'well-being duty' on public bodies aimed at achieving 7 national well-being goals for Wales - a Wales that is prosperous, resilient, healthier, more equal, has cohesive communities, a vibrant culture and thriving Welsh language, and is globally responsible. In discharging their respective duties under the Act, each public body listed in the Act (which includes the Councils comprising the CCRCD) must set and published well-being objectives. These objectives will show how each public body will work to achieve the vision for Wales set out in the national well-being goals. When exercising its functions, the Regional Cabinet should consider how the proposed decision will contribute towards meeting the 'well-being duty' and in so doing assist to achieve the national well-being goals.

32. The well-being duty also requires Councils to act in accordance with a 'sustainable development principle'. This principle requires Councils to act in a way which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. Put simply, this means that Regional Cabinet must take account of the impact of their decisions on people living their lives in Wales in the future. In doing so, Regional Cabinet must:

- look to the long term;
- focus on prevention by understanding the root causes of problems;
- deliver an integrated approach to achieving the 7 national well-being goals;
- work in collaboration with others to find shared sustainable solutions;
- involve people from all sections of the community in the decisions which affect them.

33. Regional Cabinet must be satisfied that the proposed decision accords with the principles above

34. To assist Regional Cabinet to consider the duties under the Act in respect of the decision sought an assessment has been undertaken, attached as an appendix to this report (Well–being of future generations assessment) for member's consideration.

35. *In preparing reports due regard must be given to the Statutory Guidance on the Act issued by the Welsh Ministers, which is accessible using the link below: http://gov.wales/topics/people-and-communities/people/future-generations-act/statutory-guidance/?lang=en*

Equality Act 2010

36. In considering this matter regard should be had, amongst other matters, to the Councils' duties under the Equality Act 2010. Pursuant to these legal duties the Regional Cabinet must in making decisions have due regard to the need to (1) eliminate unlawful discrimination (2) advance equality of opportunity and (3) foster good relations on the basis of protected characteristics. Protected characteristics are:

- age;
- gender reassignment;
- sex;
- race – including ethnic or national origin, colour or nationality;
- disability;
- pregnancy and maternity;
- marriage and civil partnership;
- sexual orientation;
- religion or belief – including lack of belief.

37. **An Equality Impact Assessment** has been undertaken and is attached as part of the wider Future Generations assessment appended to this report. Regard should be had to the same in reaching a decision on this matter. The purpose of the Assessments is in order to ensure that the Council has properly understood and assessed the potential impacts of the proposals in terms of equality, so that it can ensure that it is making proportionate and rational decisions having due regard to its public sector equality duty.

RECOMMENDATIONS

38. Regional Cabinet is asked to:

1. Note the work completed in respect of the original proposed business case for digital infrastructure attached at Appendix 1;

2. Approve the change in direction set out in this report around digital infrastructure, specifically around the re-positioned LFFN bid;

3. Note the development of one shared digital infrastructure plan for CCR with Wales Government and the principle of the development of a business case for a joint 'bridging fund' with WG, which will be the subject of a further report following key foundational work and will be submitted as a proposal to the Investment Framework.

4. Approve the emphasis on shaping the wider digital agenda in line with the priorities outlined in the Industrial Growth Plan and via the forthcoming Investment Prospectus.

5. Agree to fund the costs associated with LFFN development to date, noting:

    a) that the costs of £91,000 expended to date with the further £15,000 needed to finalise the revised bid, which, when offset against the resources available from the original digital business case work, totals £59,000; and

    b) the revised DCMS LFFN Wave 2 submission attached at Appendix 2;

6. Agree to delegate authority to the City Deal Director (in consultation with the Portfolio Member and Joint Committee s151 Officer) to finalise the re-positioned bid, within the financial parameters outlined in this report;

7. Approve to re-position the lead for the revised LFFN whole-region scheme from Newport City Council to the City Deal Office and note that an update report will be brought back in due course.

Kellie Beirne
Cardiff Capital Region City Deal Director
15 July 2019

Appendices
Appendix 1 – Cube Outline Business Case
Appendix 2 – Revised LFFN bid
Appendix 3 – Well-being of Future Generations Assessment

Cardiff Capital Region City Deal
The Digital Network

Draft
Outline Business Case

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1 Executive Summary

This paper presents an Outline Business Case for digital infrastructure investment in the CCRCD region

Strategic Case

There is broad and proven recognition that the provision of digital services drives economic growth and enables social inclusion and cohesion. There is also a growing recognition that the availability of world class digital connectivity stimulates innovation and the creation of new business streams.

The breadth and quality of digital infrastructure available in Wales has fallen behind that found in many other parts of the UK and the Cardiff Capital Region has significant gaps in service provision and availability. For example;

- There remain a large number of rural sites not able to access superfast (>30Mbops) broadband services. There are over 8000 sites in the region falling beneath the UK Governments stated Universal Service minimum threshold of 10Mbps for broadband services
- The number of business and residential premises with access to full fibre services is <3% in the region. In contrast the City of London has 12.5% availability. Internationally the comparisons are starker with Japan 97%, Sweden 44% and an EU average of 14%.

CCRCD intends to work alongside the UK Government, the Welsh Government and industry to deliver world class, high-quality, full fibre and wireless digital services across the region.

Connectivity is a key aspect of the City Deal that calls for a future-proofed deployment of both fixed fibre and mobile networks that will provide a transformative foundation for both businesses and citizens across the region and beyond.

However, it should be stated that digital connectivity is not an end in itself but a key enabler for the region in its economic investment plan. CCRCD aspires to an intervention, growth and investment prospectus that is underpinned by enhanced digital connectivity.

There are a range of digital connectivity interventions that will support the strategic aims for the region, but these will need to be developed into separate sets of objectives as follows;

i. Ensure cities and development zones have access to open world class full fibre infrastructure. This will:
   - improve the quality of public service delivery by ensuring all public buildings are digitally connected, facilitating improved efficiency and public access to services

- deliver cost savings to the public sector for digital connectivity
- stimulate competition and choice in digital services
- stimulate inward investment in the region by telecommunications industry and hence improve access to services for residents and businesses
- deliver economic benefits through the usage of digital infrastructure, notably increased efficiency and enhanced productivity
- directly support and stimulate the digital transformation of services and products

ii. Facilitate equality of access to broadband services[1] across the region, notably in rural areas. This will deliver the following spending objectives;
- improve the quality of public service delivery by ensuring communities in remote areas have access to services
- social cohesion and inclusion across the region to sustain communities
- stimulate economic growth by enhancing opportunities for employment.

iii. Stimulate innovation through the delivery of enhanced wireless infrastructure by:
- specific projects should be identified that will act as a proof of concept against which decision about further investment by the operators, or in cooperation with CCRCD, can be made. In order to open 5G and IoT use cases and projects to the widest audience, a challenge fund is proposed through which innovation can be stimulated.

iv. Creation of a fully Open Data environment by:
- making all of the vast amount of publicly held data (with the exception of certain data, for example sensitive personal data) available to all, without copyright, patents or other methods of control to drive competitiveness and innovation.

[1] It should be noted that there exists a range of Welsh Government and UK Government led initiatives to address the rural connectivity challenge. CCRCD fully supports these Welsh Govt and UK Govt initiatives and would not replicate such programmes. Any intervention in the rural market by CCRCD would, if at all, be on the supply side. It is considered that the most effective way to support this is by the CCRCD providing working capital and equity to potential suppliers addressing this issue.

Economic Case

Options have been considered to address the strategic objectives of the region. Those shortlisted are shown in the table below

Strategic Objective	Original Outline Business Case Theme	Recommended approach
Full Fibre Provision	Regional Connectivity	• Fully or partially fund duct and fully open access fibre infrastructure in selected areas • Supply side engagement
	Global Connectivity	• Support Welsh Govt Initiative in funding applications and design
	Welsh Connectivity	• Sort term programme to reposition and promote IX
Stimulate innovation through the delivery of enhanced wireless infrastructure	5G	• Targeted investments in specific projects and use cases • Supply side engagement • Implement Telecoms Infrastructure Review
	Sensing CCRCD	• Establish innovation framework and targeted investments
	Wi-Fi	• Do nothing
Facilitate equality of access – Rural Broadband Provision	Community Fibre	• Strategic supply side investments from Challenge Funds • Support UK and Welsh Govt rural initiatives
Open Data	Open Data	• Through a form of Challenge funding, develop both private and public sector proof of concepts • Ensure all actions allow the evolution into a DataCo at the earliest opportunity to stimulate demand, skill, jobs and outcomes

Commercial Case

The commercial case defines the recommended procurement routes, service specifications and commercial and contractual considerations. These are different for each stream and shaped by:

- Stakeholders appetite to invest in public sector assets and infrastructure
- Commercial appetite for inward investment
- Ensuring state aid compliance
- Ensuring investments are complementary to the activities of the PSBA
- Complementary to other national and regional schemes

Financial Case

A summary of the proposed expenditure under each is presented in the table below. The table splits out that potentially invested by CCRCD along with leveraged commercial investment. It should be noted that commercial investment is likely to emerge in two waves; an initial direct contribution to the proposed programme plan and then in addition, there will be secondary pull through investment by the commercial sector as subsequent investment will be made to enhance and expand the digital infrastructure facilitated by CCRCD.

There are strong positive economic and social impacts for all interventions. The analysis undertaken has been careful to apply economic multipliers that have been used in other government programmes to support their business case.

The table below summarises the budget spend and investment sources along with associated benefits. It is estimated that the proposed digital initiatives will result in over £128m of direct and pull through commercial investment and an economic stimulus to the region of over £325m over the next 15 years.

£ - millions	CCRCD Contribution over 5 years	Estimated Leveraged Private Sector Investment over 5 years	Economic Benefit over 15 years
Infrastructure Fund (5year programme)			
Development Zones Fibre	£7.0 (Plus £7.0m grant from DCMS)	£6.0m initial investment, plus> £70m pull through investment (1)	>£220m
Challenge Fund (5-year programme)			
Equity of access; Investment in broadband service providers	£20m	£40m – based on pull through investments and demand stimulation (3)	>£70m
Next Generation Wireless	£7m	£7m (2)	>£20m
Open Data	£5m	£5m (2)	>£15m
Cumulative 5 Year Revenue Costs	£5m		
Total	**£44m**	**>£128m**	**>£325m**

2 Outline Strategic Case

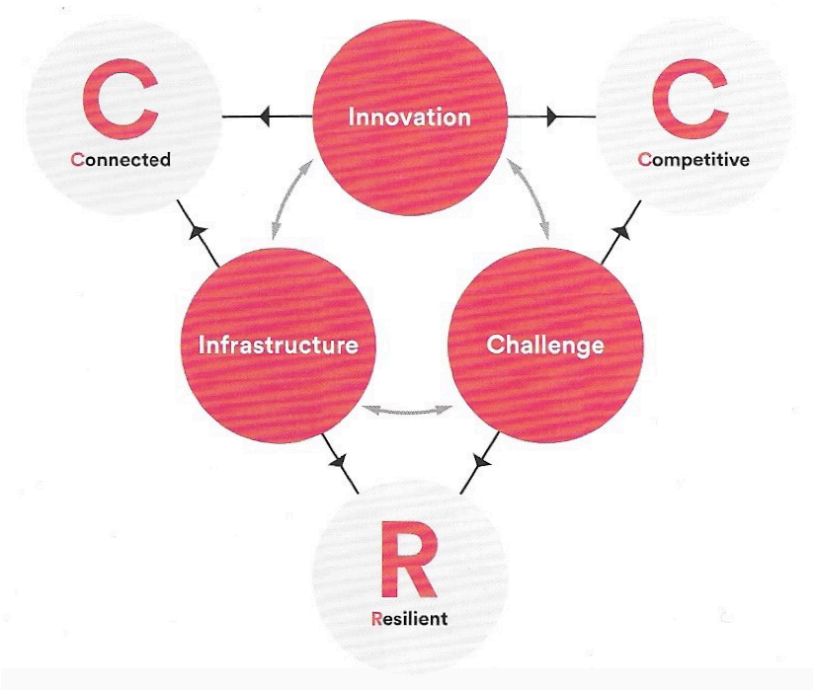
2.1 Strategic Context

21.1 Background

The CCRCD was established in 2016 based on the key objectives of driving growth, inclusivity and sustainability. It is a region with the main urban centres in Wales, complemented by a wider urban and rural landscape and a significant coastal footprint that has created a diverse economic profile with numerous opportunities and challenges.

The region has a highly skilled and educated workforce. However there remain challenges; notably the need for an upturn in productivity and increased participation rates. The region also has challenges in terms of availability of physical and digital infrastructure.

The planned interventions within the City Deal represent a fifteen-year programme with a commitment of £1.2 billion for the region, focussed around three key dimensions, Innovation, Infrastructure and Challenge. Within this framework a requirement has been identified for enhanced connectivity.



Connectivity is a key aspect of the City Deal that calls for a future-proofed deployment of both fixed fibre and mobile networks that will provide a transformative foundation for both businesses and citizens across the region and beyond.

Improving the connectivity within the region is critical[2] as the region has suffered from a lack of commercial investment in digital infrastructure that consequently has resulted in an underlying gap in delivery capability compared with other regions of the UK. A continued failure[3] to

[2] Many policy documents and strategic intents from both the UK and Welsh government attest to the criticality.

[3] There are numerous case studies that demonstrate that poor digital infrastructure leads to lower GVA and which have been instrumental in the intervention funding in fixed and mobile networks already provided by DCMS, the Welsh Government and

address the issue directly, will have a severe negative impact on the region and lead to:

- Loss in local productivity, employment and reduction in GVA
- A failure to attract inward investment by highly skilled digital intensive industries
- An adverse impact on the delivery of local services, notably education, health and transport
- Environmental challenges
- A widening gap in access to digital services across the region leading to further isolated communities
- Limiting digital transformation across the public and private sector
- The cities and development zones of the region losing competitive advantage.

However it should be stated that digital connectivity is not an end in itself but a key enabler for the region in its economic investment plan. CCRCD aspires to an intervention and growth plan and investment prospectus that is underpinned by enhanced digital connectivity.

Digital connectivity represents the building and enhancing of a critical **enabling** digital environment within which a wider, but completely complimentary, set of strategic aims can be articulated;

1. existing businesses exploiting Digital Infrastructure applications to generate **productivity improvements**

2. existing businesses exploiting Digital Infrastructure applications to **innovate new business models and open new markets**

3. **new business start-ups** capitalising on Digital Infrastructure to operate new digitally dependent business models at lower cost and more flexibly than established businesses

4. economic and employment impacts associated with any new **network build**, including on-going network and application support

5. **Skills development** across digital sectors to drive higher value employment opportunities

6. a rise in **new working practices**, enabled through Digital Infrastructure[4], communications/conferencing/collaborative tools, applications and delivering additional digital transformation benefits

7. Opening the way for **teleworking to stimulate Rural business models** which positively impacts the environment, maintaining communities, as well as job creation through distributed working

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Local Authorities across the UK. Leading edge digital infrastructure is also identified as a key catalyst in driving improvements in productivity and the environment.

[4] Specifically 'Cloud' based operation and services and Digital Transformation

8. **private household benefits,** via increases in house price and housing wealth

9. s**ustaining communities** through remote access to digital services and by allowing rural SMEs to work and conduct business through digital platforms

10. the enablement of **5G** mobile networks and associated Use Cases to accelerate its deployment to lead the way rather than historically being a follower

11. **smart cities/homes infrastructure** offering reductions in energy use, congestion and fuel costs stemming from smart management, smart energy and smart travel systems

12. increased manufacturing productivity secured from the emerging digital revolution in manufacturing (**Industry 4.0)** and connected **Internet of Things (IoT)**

Advanced digital infrastructure also enables many other social benefits, such as;

13. **healthcare benefits** through advances in connected health technologies

14. **environmental impacts** through carbon reduction, travel reduction, home working etc.

15. **Social inclusion and removal of any Digital Divide**

In order to address these issues, the overarching investment objectives around connectivity for CCRCD is to deliver a portfolio of digital interventions that seek to create a digital vision, brand and identity for the region as a ‘smart’ city region able to attract and build on existing assets and human capital and attract private sector partnerships. It will also play a pivotal role in making sure that national related digital interventions and opportunities are built into the regional schemes and projects.

In 2018 CCRCD defined a digital connectivity portfolio of initiatives to underpin its objectives;

- ***Global Connectivity:***
  Implementation of a transatlantic link to enable the fastest possible connection to the global digital network.
- ***Welsh Connectivity:***
  Exploitation of the existing Cardiff Internet Exchange (IX).
- ***Regional Fibre Connectivity:***
  Creation of a strategic site dark fibre network as a public asset. This would support the volume of public, private, research and citizen-based traffic into and around CCRCD.
- ***Community Fibre Connectivity:***
  A high speed fibre network to connect local communities.
- ***Regional/Community WiFi:***
  A ubiquitous public WiFi network as a public utility to be maintained by the private sector on an ongoing basis.
- ***Mobile 5G Access:***
  Implementation of a 5G network.
- ***Sensing the CCRCD:***
  A sensor network across the region through a canopy of connectivity from access points mounted on e.g. street lights.
- ***Open Data:***

Through these actions the region will seek to achieve;

Prosperity and Opportunity:

Building the capacity of individuals, households, public sector and businesses to meet challenges and grasp opportunity creating a more productive economy

Inclusion and Equality:

A vibrant and sustainable economy which contributes to the well-being and quality of life of the people and communities in the region now and in the future

Identity, Culture, Community and Sustainability:

Forging a clear identity and strong reputation as a City-Region for trade, innovation, and quality of life

Throughout late 2018 a programme of research was undertaken addressing each of these ten project areas and presented in a series of workshops and presentations with stakeholders. This work is summarised in this outline business case (see Economic Case Long List).

Based on the work undertaken it was clear that a number of the projects should be prioritised as they are critical to making the economy more competitive and productive through innovation and infrastructure provision. These are:

- Delivery of an extensive full fibre footprint through interventions and investments that are complementary to commercial plans and other interventions by the Welsh and UK Governments.
- Delivery of world class wireless infrastructure; notably stimulating 5G and IoT deployment and usage
- Having a clear strategy and delivery plan for Open Data provision.

212 **Organisation overview**

The Cardiff Capital Region (CCR) comprises the ten local authorities in South East Wales (Blaenau Gwent; Bridgend; Caerphilly; Cardiff; Merthyr Tydfil; Monmouthshire; Newport; Rhondda Cynon Taf; Torfaen; and Vale of Glamorgan), and the CCR Cabinet is made up of the Leader from each of those authorities. It is the ultimate decision-making body for the CCR City Deal, responsible for overseeing and coordinating the councils' obligations in respect of the City Deal.

The main responsibilities of the CCR Cabinet include:

- Managing the CCRCD Wider Investment Fund (decisions on projects and schemes to be funded are taken by the Regional Cabinet)
- Overseeing the progress of the CCR City Deal and to give strategic direction, delivering the agreed CCR City Deal Strategic Business Plan; The plan specifies the regional strategic objectives of the CCR City Deal and key themes have been identified to focus the approach:
  - Skills and Employment,
  - Innovation,
  - Connecting the Region, and
  - Regeneration and Infrastructure.
- Considering the scope for strengthening Capital Region governance further, subject to the agreement of the ten local authorities.

The programme aims to deliver up to 25,000 new jobs, achieve 5% increase in GVA and leverage an additional £4 billion of private sector investment.

Both the UK and Welsh Government are contributing to the Capital City Region Investment Fund, while the ten local authorities themselves will also contribute over the 20-year duration of the Fund. The largest part of the investment will fund the proposed Metro network for South East Wales.

The Cabinet are responsible and accountable for;

- Managing the CCR Wider Investment Fund (decisions on projects and schemes to be funded are taken by the Regional Cabinet)
- Overseeing the progress of the CCR City Deal and to give strategic direction,
- Delivering the agreed CCR City Deal Strategic Business Plan
- Considering the scope for strengthening Capital Region governance further, subject to the agreement of the ten local authorities

To support the Cabinet, there are a number of advisory bodies;

- CCR Transport Authority
- CCR Skills Partnership
- CCR Economic Growth Partnership
- CCR Business Council

All interventions will be subject to the submission of detailed business cases and approval by the Welsh and UK Governments. This Outline Business Case represents the connectivity strands within the overall deal.

2.1.3 **Other relevant strategies**

Digital transformation and Digital Infrastructure features in a very wide range of strategies across UK Government, Welsh Government and Local Authorities. This is matched by transformation programmes within the private sector.

UK Strategy	Strategic Intent Summary	Digital Infrastructure Fit	Link
The Grand Challenges DBEIS	Put the UK at the forefront of the AI and data revolution Harness the power of innovation to help meet the needs of an ageing society Maximise the advantages for UK industry from the global shift to clean growth We will become a world leader in shaping the future of mobility	AI and Data require widespread and high capacity digital connectivity Key enabler is technology that has fixed and mobile connectivity widely available and high capacity Reduction in the need to travel and the 'Smart' control of energy systems Mobility demands high capacity and widespread mobile communications	https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges
UK Digital Strategy DCMS	Building World Class Digital Infrastructure, including full fibre and 5G Give everyone access to the digital skills they need Making the UK the best place to start and grow a digital business Helping every British business become a digital business Maintaining the UK government as a world leader in serving its citizens online Unlocking the power of data in the UK economy	A central part of what Digital Infrastructure project will deliver Widespread deployment and hot-spots of 5G will drive the development of skills Digital Infrastructure is a pre-requisite, alongside the other central SBCD projects in digital media Making high quality digital connectivity widely available is a critical enabler Digital transformation requires digital infrastructure to deliver the services Data analytics is core to new digital services	https://www.gov.uk/government/publications/uk-digital-strategy
Future Telecoms Infrastructure DCMS	Fixed and mobile networks will be the enabling infrastructure that drives economic growth Nationwide Full Fibre connectivity, there must be a sharp increase in the pace of full fibre roll out Making the cost of deploying fibre networks as low as possible by addressing barriers to deployment Supporting market entry and expansion by alternative network operators An 'outside in' approach to deployment that means gigabit-capable connectivity across all areas of the UK is achieved at the same time A switchover process to increase demand for full fibre services We want the UK to have high quality mobile connectivity where people live, work and travel Alongside finishing the roll out of 4G networks to meet existing mobile demand, we want the UK to be a world leader in 5G	The Digital Infrastructure project is based upon this Full Fibre is a one of the key objectives under the connected Cities element of Digital Infrastructure project Part of Digital Infrastructure is the deployment of publicly owned infrastructure assets to reduce roll out costs Open procurements are planned for all Digital Infrastructure Rural connectivity is a key objective of Digital Infrastructure project Demand and Supply simulation are both planned within Digital Infrastructure Support for supply side actions and lowering build costs for 4G are included Construction of 5G hot-spots is a key objective	https://www.gov.uk/government/publications/future-telecoms-infrastructure-review
5G Strategy for the UK DCMS	Government has a clear ambition for the UK to be a global leader in the next generation of mobile technology – 5G Digital infrastructure is a building block of the Government's modern Industrial Strategy Deliver three main outcomes: ・accelerating the deployment of 5G networks ・maximising the productivity and efficiency benefits to the UK from 5G ・creating new opportunities for UK businesses at home and abroad, and encouraging inward investment	5G in support of specific and key projects in included Several aspects of the SBCD deal and specifically Digital Infrastructure addresses this directly Accelerating deployment through direct intervention and supporting infrastructure roll-out Projects will demonstrate productivity and efficiency gins across several sectors Availability of leading edge connectivity through Digital Infrastructure project will encourage inward investment	https://www.gov.uk/government/publications/next-generation-mobile-technologies-a-5g-strategy-for-the-uk

Table 1 - Key UK strategies

UK Strategy	Strategic Intent Summary	Digital Infrastructure Fit	Link
Digital Strategy and Leadership DCMS	Developing a local digital infrastructure strategy: ・A senior digital champion to lead the process ・Bringing together local teams involved in deployment of digital infrastructure ・Putting in place the required skills and resources ・Collaborating with network providers	A central SBCD team under a single leadership is proposed Coordination of the 4 Local Authorities is proposed Development and recruitment of key skills and resources in proposed Working closely with communications Service Providers is proposed	https://www.gov.uk/guidance/digital-strategy-and-leadership
Innovate UK, Industrial Challenge Fund DBEIS	Next Generation services are predicated on leading edge digital infrastructure Transforming construction envisages digital design and IoT Robotics across a wide number of sectors Next Generation services for AI and embeded digital technology Leading edge healthcare, including digital technologies Driverless Cars Creative Industries clusters	Includes digital technologies as a key component which will require leading edge connectivity in fibre and 4G/5G Distributed design and IoT are all included in the project Robotics require leading edge fixed and mobile connectivity AI and analytics require leading edge fixed and mobile connectivity Healthcare requires leading edge fixed and mobile connectivity, particularly the new wave of wearable devices Autonomous vehicles need widespread 5G Creative industries are primarily digitally based and need leading edge fixed and mobile connectivity	https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation
Catapults	Various Streams, including: Digital, Energy, Future Cities, High Value Manufacturing, Offshore renewable energy and transport systems	Although these are not government entities, they are closely linked with Innovate UK and act as a delivery partner in many cases. A large number of their interest areas align directly with the Digital Infrastructure project	https://catapult.org.uk/catapult-centres/

Table 2 - Key UK Strategies

Wales Strategy	Outline	Fit	Link
Well-being of Future Generations (Wales) Act 2015	A prosperous Wales	Directly supports the goal through delivering innovation, low carbon, expands skills and employment to new high-value roles	http://futuregenerations.wales/about-us/future-generations-act/
	A resilient Wales	Supports economic change through digital transformation	
	A healthier Wales	Supports technology's part in delivering health of the nation	
	A more equal Wales	Supports the removal f the digital divide across all sectors	
		Supports well connected communities and governments	
	A Wales of cohesive communities		
Digital First Welsh Government	Helping the public sector provide excellent online digital services to the people and business of Wales	Delivering online services requires digital connectivity to those services, through fixed of mobile networks being supported by the project	https://gov.wales/topics/science-and-technology/digital/public-services/digital-first/?lang=en
	Seek to develop the infrastructure required to support digital service delivery	A key element of the infrastructure is the digital connectivity with the right coverage and quality, both delivered by the project	
	Digital Transformation forms a central part of the Welsh Governments plans to make public services more meaningful to users	Digital Transformation is enabled and driven by the availability of digital infrastructure	
Delivering Digital Inclusion Welsh Government	To ensure that everyone who wants to be online can get online, protect themselves and their friends and families online and do more online to fully benefit from the opportunities the internet and other digital technologies offer	The Digital Infrastructure project is directly focused on this vision and expands upon it to ensure everyone has network access, but also that access meets the demand of the user, including ultrafast and full fibre links and 4G/5G links	https://gov.wales/docs/dsilg/publications/comm/160316-digital-inclusion-strategic-framework-en.pdf
Mobile Action Plan Welsh Government	The planning system has a key part to play in maximising mobile phone coverage across Wales	Specific proposals are made related to a central SBCD function to support efficient planning processes	https://gov.wales/topics/science-and-technology/digital/infrastructure/mobile-action-plan/?lang=en
	The public sector in Wales has thousands of assets that could be used to site mobile telecommunications infrastructure on public land, public highway and buildings	Specific proposals are made related to a central SBCD function to support efficient asset management processes	
	The topography and population density in Wales throws up specific challenges for mobile coverage. Extending coverage as far as possible is likely to require innovative solutions particularly in rural areas.	The use of new ways to achieve rural connectivity is included for both fixed and wireless technologies	
	The investment being made by the mobile industry towards regulatory targets will significantly improve mobile connectivity in Wales both in terms of voice and data. However, it is likely that there will still be areas of Wales without a usable and reliable mobile signal	A central team is proposed for SBCD to act as a voice for the region in both investment and regulatory compliance and to work with the Emergency Service coverage requirements	
Digital Wales Welsh Government	Inclusivity: Making sure everyone can enjoy the benefits of technology is a key part	Digital Infrastructure project has a key objective of the widest possible connectivity services	https://gov.wales/topics/science-and-technology/digital/?lang=en
	Skills: We will use technology to improve teaching methods and learning. Beyond schools, we will ensure that everyone in Wales can acquire the basic skills and confidence to get online and use digital technologies.	Utilising technology for skills and education requires underpinning digital infrastructure of the highest quality as delivery moves into video and augmented reality, both considerations for the project	
	Economy: We want to drive economic growth. We will support Welsh companies to network with research departments to create and commercialise new digital technologies. We will help more Welsh companies to exploit these developments to innovate, grow and access new markets, especially in our priority sectors	Leading edge digital infrastructure will support inward investment and innovation directly	
	Public services: We will make more public and government services digital so they are easier to access	Digital Transformation in services requires access via digital networks	
	Infrastructure: To deliver all the benefits of digital technology, we aim to ensure that all residential premises and businesses in Wales will have access to high speed broadband. We will continue to work to eliminate 'not spots' and to ensure that there is fair and equal access to higher speed broadband and to improve mobile coverage	A fundamental aspect of the project is to ensure the widest possible coverage of both fixed and mobile communications	

Table 3 - Key Welsh Strategies

22 The Case for Change

2.2.1 Spending and Investment Objectives

Digital connectivity is a key enabler to deliver the economic and social benefits within the City Deal.

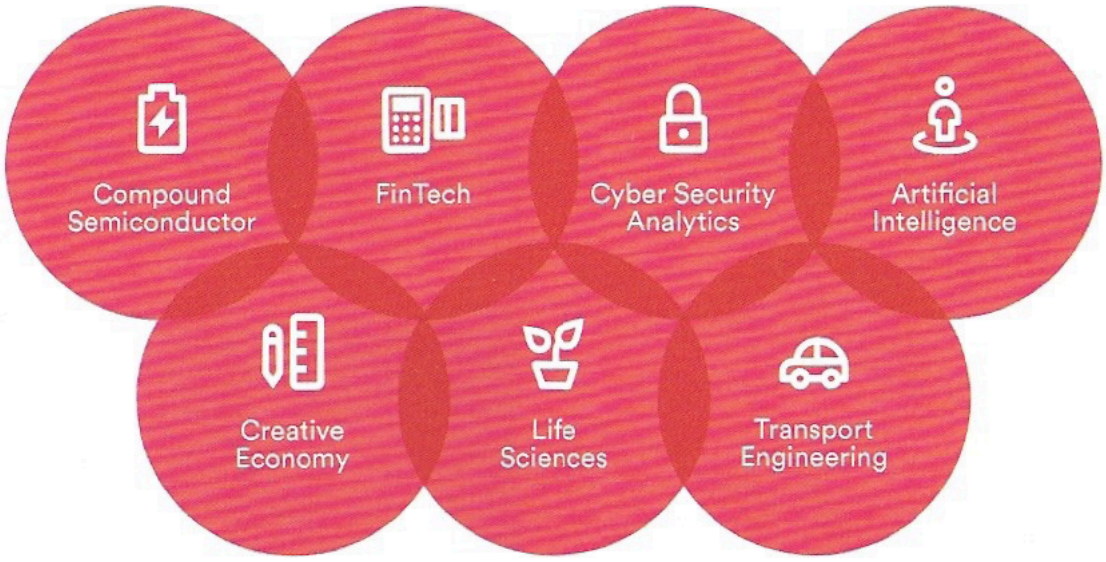
CCRCD will need to work alongside the UK Government, the Welsh Government and industry to deliver world class, high-quality, full fibre and wireless digital services across the region.

The CCRCD Vision;

"A Prosperous Capital City-Region for Wales" - a decision making centre, a global gateway for capital, trade, and visitors, a knowledge hub and a major population centre and business cluster for Wales"

City Deal's Digital Network will deliver its objectives by supporting intervention in specific areas and for specific projects through a combination of connectivity types, and service delivery depending on what is most suited.

Figure 1 - CCRCD Investment Sectors



It must be remembered that the digital connectivity rests within a dynamic service provision environment, operated by large independent private sector organisations. It also exists within a number of existing digital infrastructure intervention programmes operated by the UK and Welsh governments.

There are a range of digital connectivity interventions that will support the strategic aims for the region. This leads to the position that they need to be developed into separate sets of objectives.

i) Ensure cities and development zones have access to open world class full fibre[5] infrastructure. This will;

- improve the quality of public service delivery by ensuring all public buildings are digitally connected facilitating improved efficiency and public access to services
- deliver cost savings to the public sector for digital connectivity
- stimulate competition and choice in digital services
- stimulate inward investment in the region by telecommunications industry and hence improve access to services for residents and businesses
- deliver economic benefits through the usage of digital infrastructure, notably increased efficiency and enhanced productivity.

ii) Facilitate equality of access to broadband services across the region, notably in rural areas. This will deliver the following spending objectives;

- improve the quality of public service delivery by ensuring communities in remote areas have access to services
- social cohesion and inclusion across the region to sustain communities
- stimulate economic growth by enhancing opportunities for employment.

iii) Stimulate innovation through the delivery of enhanced wireless infrastructure through;

- specific projects should be identified that will act as a proof of concept against which decision about further investment by the operators, or in cooperation with CCRCD, can be made. In order to open 5G and IoT use cases and projects to the widest audience, a challenge fund is proposed through which innovation can be stimulated.

[5] *It should be noted that there exists a range of Welsh Government and UK Government led initiatives to address the rural connectivity challenge. CCRCD fully supports these Welsh Govt and UK Govt initiatives and would not replicate such programmes. Any intervention in the rural market by CCRCD would, if at all, be on the supply side. Providing working capital and equity to potential suppliers addressing this sector.*

iv) Creation of a fully Open Data environment by;

- making all of the vast amount of publicly held data (with the exception of certain data, for example sensitive personal data) available to all, without copyright, patents or other methods of control to dive competitiveness and innovation.

The following sections address each of these objectives in turn.

2.2.2 **Delivering Full Fibre**

Spending objectives

It is the objective of the CCRCD to ensure that the regions cities and development zones have access to world class infrastructure to deliver economic growth and inward investment. This infrastructure needs to be:

- Full fibre to the premises
- Gigabit plus capable
- Fully scalable and future proofed
- Drives lower cost access through choice and competition
- Able to be used by multiple service providers to drive innovation and digital transformation.

Existing Arrangements

The cities and development zones in the region have a very low penetration of full fibre to the premise. Table 6 shows the 2018 Ofcom data[6] that reveals the penetration full fibre services[7] in the region.

[6]https://app.powerbi.com/view?r=eyJrIjoiZTg4NDMyZjctNWJhZS00MjNjLWIxYzMtZjkwYzljNDk2NzdmIiwidCI6IjBhZjY0OGRlLTMxMGMtNDA2OC04YWU0LWY5NDE4YmFlMjRjYyIsImMiOjh9

[7] Full fibre able to deliver Gigabit speeds, Ultrafast 300Mbs, Superfast 30Mbs, USO=below 10Mbs

	% of premises able to receive Full FIbre
Bleanau Gwent	1.00%
Bridgend	4.60%
Caerphilly	0.40%
Cardiff	3.30%
Merthyr Tydfil	2.00%
Monmouthshire	5.20%
Newport	2.20%
Rhonda Cynon Taf	1.80%
Torfaen	2.20%
Vale of Glamorgan	3.10%

Table 4 - Full Fibre Availability (UK 4.1%)

In contrast the City of London has 12.5% availability of Full Fibre. Internationally the comparisons are starker with Japan 97%, Sweden 44% and an EU average of 14%. Despite the fact that BT has announced a programme of investment in the key commercial centres in Cardiff, it is unlikely this will lead to deeper roll out and availability in the region in the next five years. Similarly, alternative network operators are prioritising other centres in the UK. The Cardiff City Region City Deal must therefore have an objective to address this challenge.

Existing infrastructure is largely provided by the incumbent carriers BT and Virgin Media. There is a small footprint of full fibre in the City of Newport delivered by City Fibre (largely linking the CCTV sites) and Pinacl linking Newport City Council Buildings.

The Welsh Government is also potentially a relevant stakeholder. A Trunk Road concession contract is being awarded to deploy ducts and fibres across the trunk roads from the Severn Bridge to Pembroke. This would create a fibre spine across the region potentially facilitating connectivity to Ireland and beyond. At the time of writing this project is subject to DCMS funding approval. In addition the west coast of Wales is a termination point for the proposed Greenlink power (and potentially fibre) link from Ireland[8]. Is essential these projects are interlinked by fibre connectivity. Feedback from both the telecommunications industry as well as other key sectors (e.g. media and digital content) looking to invest in South Wales has stated that they require diverse routing across South Wales to Ireland and beyond. Supporting and coordinating these initiatives in Wales would result in a large capacity diverse route in the form of a loop taking in Dublin and linking across via another undersea cable to Liverpool and Manchester. If a fibre route such as this was constructed it would immediately put Cardiff and the region on a par with Manchester in terms of digital access, opening opportunities that are currently out of reach for data centres and cloud services, as well as inward investment from media and content providers.

[8] https://www.greenlinkinterconnector.eu/

The Business Need

In order to improve the position and unlock the benefits available to business and homes, the objectives will focus on the provision of new duct and dark fibre (or equivalent) infrastructure which will need to be built in key development corridors and zones to underpin the strategic aims. For state aid reasons CCRCD can only invest in linking public sector assets but experience elsewhere has shown that such investment anchors and pump primes additional commercial investment into business parks, commercial centres and residential premises. Indeed other cities have experienced a multiplier of 6:1 between commercial and public sector investment.

Scope and Service Requirements

An indicative fibre routing was proposed by the region under its DCMS Local Full Fibre Network (LFFN) proposals[9].

Possible indicative fibre footprint in these priority areas is shown in Figure 5 below with green route

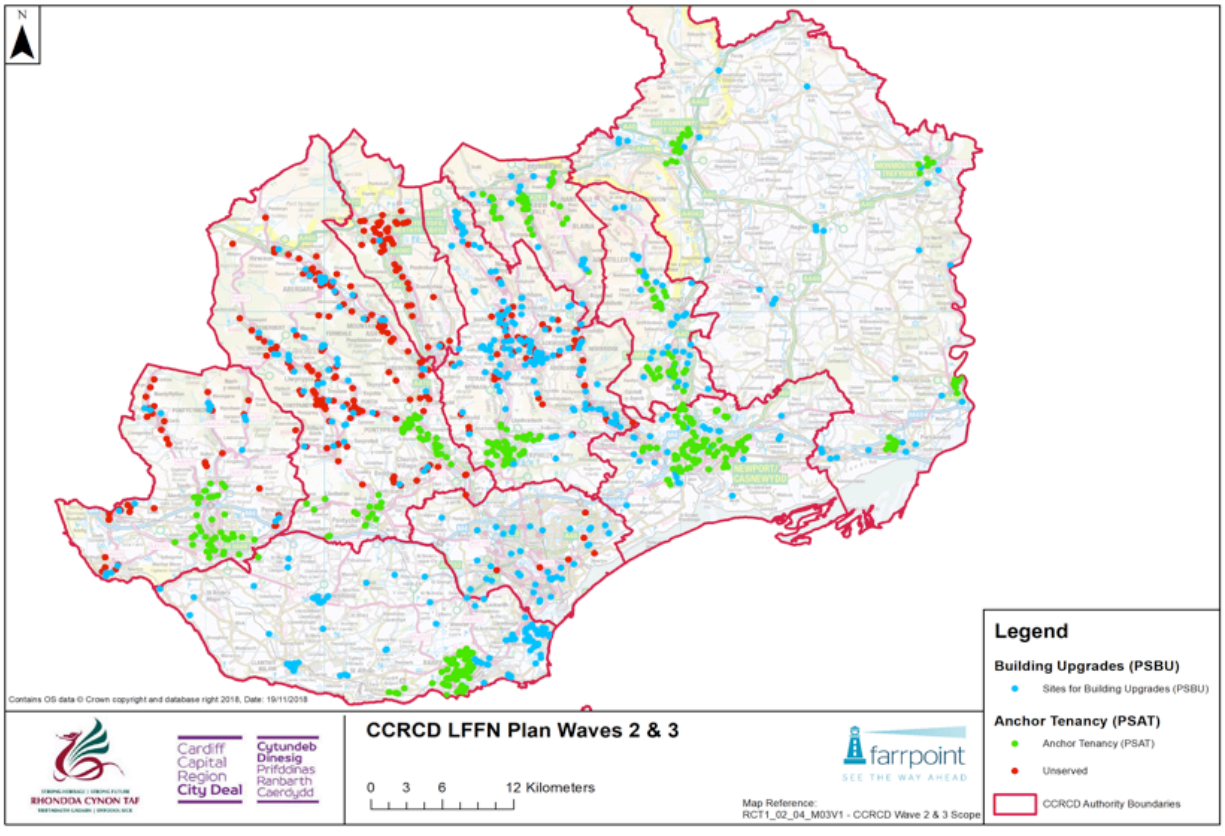


Figure 2 – Scenarios for the deployment of fibre and duct infrastructure into the region.

In the map above:

- Green areas are those into which CCRCD wishes to support new fibre and duct investment to align with development zones
- Pale blue sites are public sites in rural areas in the region lacking existing fibre infrastructure in summer 2018 (note since this time PSBA has invested in a number of these sites) which are candidates for upgrade from rural programmes

The full fibre build across the cities/ development zones may be addressed in a number of ways and, indeed, different approaches may be required in different parts of the region. We envisage the following:

- In areas such as the M4 corridor a duct build programme will be required to be complementary to the trunk road initiative. This will need to be undertaken and used by the local authorities and commercialised alongside the Trunk Road and Greenlink initiatives by commercial partners. The area is a key investment priority for CCRCD and has significant corporate demand from the transport and energy sectors.
- In other areas there is a commercial appetite for investment and believe there will be a blend of public sector duct usage, PIA and new commercial build. This will be explored during market testing and procurement.

The public sector will also be a key beneficiary of the connectivity provided and as such will gain through the accelerated and improved digital transformation of their services, offering efficiency and cost saving improvements.

The UK Government Future Telecoms Infrastructure Review, (FTIR), sets out the UK position on enhancing connectivity, including fibre to the premise and 5G. In addition, the DCMS funding for LFFN is entirely based on achieving wider access to fibre based services. The Full Fibre programme is therefore directly aligned to current government and Welsh interventions and to its wider policies.

Main benefits and risks

Research into the benefit/cost ratios that apply to digital infrastructure vary for different interventions across different deployments of digital infrastructure, but all are positive in their impact. A range of studies have been undertaken to assess the economic impact of Full Fibre deployment. The most relevant is the recent study by Regeneris - The Economic Impact of Full Fibre Infrastructure in 100 Towns and Cities. This models the cost benefits ratios over a 15-year period and reveals that there is typically an economic uplift of x 11 for each £1 invested and this can be even higher in major urban centres.

The CCRCD investment programme described above has a capital cost of approx. £20m. The modelled impacts of the direct benefits are >200m. These benefits are;

- Productivity improvements to businesses
- Start ups
- Innovation
- Network build employment

- Enhanced teleworking and worker flexibility
- Household benefits

This assumes a build up as follows;

- services enabled: 1 year after the start of network build
- 35% adoption rate reached: after 5 years
- productivity benefits achieved: 1 year after adoption
- innovation benefits realised: 4 years after adoption.

The primary risks associated with the Full Fibre intervention are given below:

Risk	Mitigation
Resources constraints	CCRCD will require a dedicated Digital team to manage the range of interventions envisioned. This will include, funding applications, procurements, stakeholder liaison, supplier engagement and interaction with external national and regional schemes
State aid challenges	Clearly defined legal and regulatory guidance required to frame selected options and activities
Integration with other interventions is challenging on timescales and governance	Be clear on the actions that City Deal are undertaking to clearly identify boundaries and overlaps. Work with other interventions to frame areas of joint interest and where joint action is called for
Other sources of funding become available to integrate into the City Deal funding for specific objectives and to leverage outcomes	Ensure the business case is able to adapt to external changes in overall funding scope and availability
Other interventions overlap with the City Deal, with early investment by CCRCD possibly losing other funding to the region	Work with other interventions to frame areas of joint interest and where joint action is **not** called for
Intervention timescales under Digital Infrastructure exceed five years due to governance or management issues	Prioritise actions within the Commercial and Management case to ensure benefits are delivered
Supplier appetite is stimulated	The telecommunications industry has finite capacity and multiple opportunities. Companies are being highly selected in terms of the areas they seek to invest in and prioritise those with greatest commercial returns and ease of implementation. There is a risk that operators may be selective in their deployment within the region.
Digital Infrastructure is delivered in a fragmented way, lessening the impact and leverage that could be achieved	Make the interdependencies between the intervention types clear and include these within the critical success factors

Table 5 - Primary Risks

Constraints and dependencies

The constraints for Digital Infrastructure intervention are shaped by:

- CCRCD governance procedures.
- Stakeholder co-ordination and participation in any proposed intervention. In particular the authorities (and potentially other public sector bodies in the region) will need to use and anchor any infrastructure deployed. This will have implications for delivery of IT and other services
- State aid that limits the ability of the public sector to invest directly into commercial opportunities in the sector without access to state aid clearance or the establishment of commercial ventures
- Supplier appetite to invest in the region.

There is also likely to be a cost associated with the management of the project by a dedicated team within CCRCD.

In terms of the dependencies, the key challenges will be:

- Need for integration and co-operation with PSBA to deliver services to the public sector across any infrastructure deployed
- Co-ordination across the public sector stakeholders in the region and the migration of existing contracts.

2.2.3 **Facilitate equality of access – Rural Broadband Provision**

Spending objectives

Rural communities in the region have long suffered from poor internet connectivity. Ofcom's data shows the comparative across local authority areas in the region and that against UK and Wales. Ultrafast defined as service with greater than 300Mbs, Superfast is above 30Mbs, but below 300Mbs.

Ofcom data also shows those **unable** to receive minimal internet connectivity.

Authority	Full Fibre % of Premises Served	Ultrafast % of Premises Served	Superfast % of Premises Served	Premises Below USO
Blaenau Gwent	1.0%	1.0%	96.9%	246
Bridgend	4.7%	4.7%	94.7%	514
Caerphilly	0.4%	0.4%	95.9%	432
Cardiff	3.3%	59.8%	97.8%	626
Merthyr Tydfil	2.0%	2.0%	95.4%	134
Monmouthshire	5.2%	5.2%	83.8%	3254
Newport	2.2%	62.8%	97.4%	586
Rhonda Cynon Taf	1.8%	9.4%	96.4%	728
Torfaen	2.2%	2.2%	95.8%	358
Vale of Glamorgan	3.1%	46.9%	94.6%	1336
				8214

Table 6 - Ofcom Broadband Data

In all cases there is a distinct variation across the region showing a level of market failure due to the cost of delivering services to areas that are more rural.

Existing arrangements

The challenge of bridging the rural gap is recognised by both the UK and Welsh Government and a range of initiatives are either planned or in place including;

- Currently in operation, Access Broadband Cymru (ABC) scheme; A De Minimis grant of £400 or £800 towards the installation costs of a better broadband connection
- DCMS Local Full Fibre Network Fund (LFFN Wave 3 & 4) will fund investment into public sector sites in rural areas
- The Welsh Govt is considering setting up a national Dynamic Purchasing Scheme to enable local additional investment to Superfast Cymru
- Universal Service Obligation – USO – introduced in UK legislation March 18 grants a right for residents and businesses with <10 Mbps to order a connection with a grant **up to £3,400** towards delivery. This figure is important as it will result in many premises in the region remaining below the USO as the cost of delivering the service exceeds this amount. Ofcom is running consultation on

the practicalities of implementing USO (suppliers' responsibilities, geographic split, services and technologies.

- DCMS Rural Gigabit Connectivity Fund will launch in May 2019 to provide connectivity in the most remote 10% of rural sites. At the time of writing details of funding to the CCRCD are unknown and there are also state aid issues. The scheme will provide funding to connect rural hubs in a village or market town with a fibre connection. This must be a public sector site such as GP, health centre, library or school. Vouchers will then be given to SMEs (and possibly residents) in proximity to this site to get connections. It is expected that DCMS will make available connection vouchers to rural SMEs and residences in the region in 2019/2020.

CCRCD fully supports these Welsh Govt and UK Govt initiatives and would not replicate such programmes. Any intervention in the rural market by CCRCD would, if at all, be on the supply side. Providing working capital and equity investment to potential suppliers addressing this sector.

Business needs – current and future

It has been widely demonstrated that rural communities with superfast levels of connectivity achieve a positive benefit/cost outcome on aggregate. Digital connectivity is transformational across a wide range of sectors and service and will also complement the regions transport and environmental strategies.

In many ways, an objective of 100% rural and urban coverage could be set but is the net impact of the national and Welsh schemes is likely to reduce the scale of the problem but it is still likely that there will remain approximately premises to be served

Hence there is a need to continued support of the supply side to encourage innovation and investment by emerging rural service providers. This can be made through strategic investments utilising the CCRCD challenge and infrastructure funds.

Main benefits and risks

The economic and social benefits of investing in rural broadband infrastructure are proven.

A direct comparator in this case is the work undertaken by Ofcom to determine the business case for the introduction of a Universal Service Obligation[10] so that every premise in the UK has connectivity at 10Mbs or above. This directly compares with the rural areas of the region. In their economic assessment, a benefit multiplier of 3.4-3.6:1 is set out.

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[10] https://www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/broadband-uso-need-to-know

A limit of £3,400 has been placed on any single connection, if the cost of connectivity is in excess of this, then a contribution will be required. It is also limited to customers who will NOT benefit from another publicly funded programme.

Independent research[11] for BT undertaken to assess the impact of investment in rural connectivity for Northern Ireland gave the following;

Benefit Category	Absolute Benefit	Benefit Multiple (relative to cost)
Productivity Growth	£50m – £410m	0.3 – 2.7
Employment Benefits	£290m - £890m	1.9 – 5.9
Teleworking	£40m	0.3

Table 7 - NI Example Benefits

In effect this gives a range of benefit multiplier of between 2.5 and 8.9. However, as the economic impact undertaken for the USO is very recent and is more conservative, the 3.5:1 figure is preferred for any rural infrastructure investment.

Quantifying benefits across what is a very diverse set of private sector and public sector bodies in the region is not possible, it can only be assessed in aggregate in line with the economic assessments that have been undertaken on the impact of digital connectivity in the UK and Europe.

[11] The analysis was the delivery of 30Mbs services across rural areas in NI, DotEcon report for BT

The primary risks associated with the Rural Connectivity are given below;

Risk	Mitigation
State aid challenges	Clearly defined legal and regulatory guidance required to frame selected options and activities
Integration with other interventions is challenging on timescales and governance	Be clear on the actions that City Deal are undertaking to clearly identify boundaries and overlaps Work with other interventions to frame areas of joint interest and where joint action is called for
Other sources of funding become available to integrate into the City Deal funding for specific objectives and to leverage outcomes	Ensure the business case is able to adapt to external changes in overall funding scope and availability
Other interventions overlap with the City Deal, with early investment by CCRCD possibly losing other funding to the region	Work with other interventions to frame areas of joint interest and where joint action is **not** called for
Intervention timescales under Digital Infrastructure exceed five years due to governance or management issues	Prioritise actions within the Commercial and Management case to ensure benefits are delivered
Demand side interventions are not fully harmonised with connectivity interventions	Ensure project plans have clear timelines and actions that recognise the interdependency with demand side stimulation Extend the skills and training remit within the City Deal to encompass supporting digital transformation and innovation of use cases making us of the Digital Infrastructure
Levels of skills around digital innovation and transformation within SMEs mean that take-up is low.	Extend the skills and training remit within the City Deal to encompass supporting digital transformation and innovation of use cases making us of the Digital Infrastructure
Digital Infrastructure is delivered in a fragmented way, lessening the impact and leverage that could be achieved	Make the interdependencies between the intervention types clear and include these within the critical success factors

Table 8 - Primary Risks

Constraints and dependencies

The constraints for CCRCD Digital Infrastructure to address the rural connectivity issue are shaped by:

- Available funds for investment
- Suitable commercial candidates for receipt of investment
- The level of control that CCRCD might have in determining where connectivity should be prioritized
- Investment returns may be less than those in more commercial attractive areas.

It is also very likely that in the rural dimension, some of the spending options to deliver infrastructure will require additional grant funding from Welsh Government or UK led schemes.

2.2.4 **Stimulate innovation through the delivery of enhanced wireless infrastructure. (5G, IoT)**

Spending objectives

5G and to some extent 4G, are seen as the next General Purpose Technology, (GPT). The term is used to describe something that will have a protracted aggregate impact across many economic and social structures. Often, electricity is sited as the primary example in the way that its introduction spawned so many innovations and change.

To this end, 5G is the first mobile telecoms technology to receive support for both its application and deployment directly through government[12] funding.

In relation to wireless mobile coverage, it is primarily 4G that is of concern in the region. Overall, Wales has the biggest urban/rural divide for 4G coverage in the UK. Coverage is behind the UK averages with Ofcom stating that 10% of the geographic area of Wales has no coverage. Also, only 36% of rural areas have complete 4G coverage, with 10% of A and B roads having no coverage. When compared to England, the corresponding figures are 3% in both cases. The 4G coverage map in Figure 4 uses Ofcom's data for EE[13] indoor coverage:

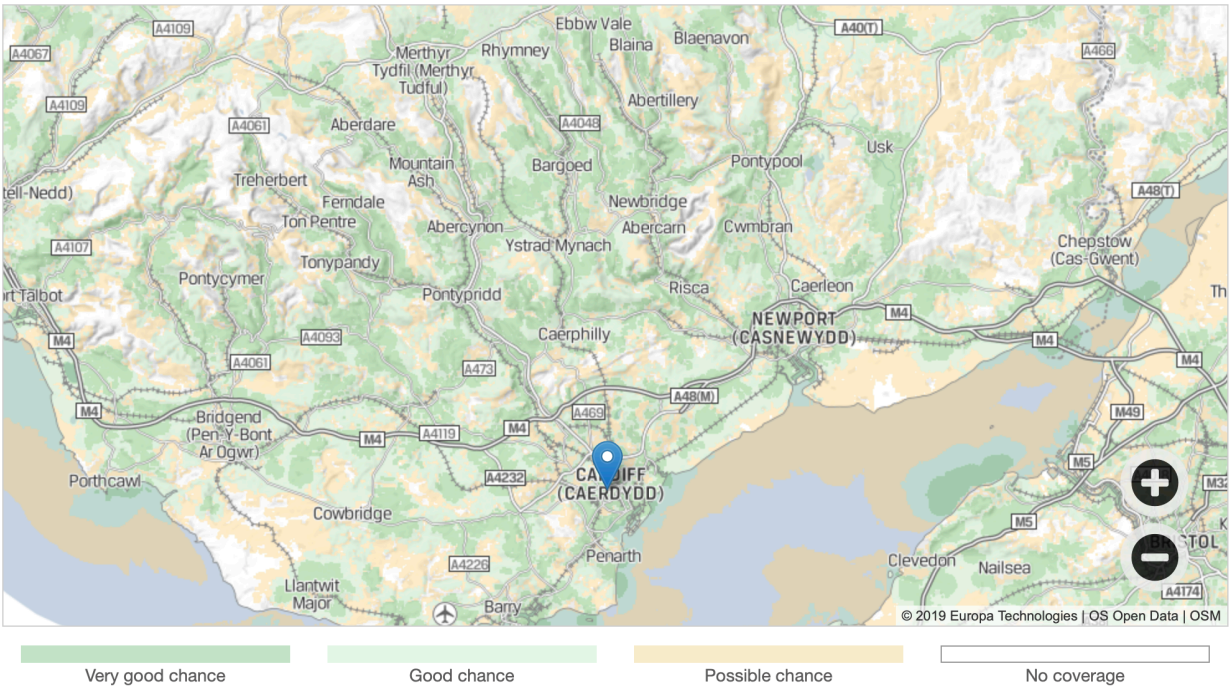

Figure 3 - 4G Coverage Map for EE

The heat map above illustrates that there remain significant gaps, even in 4G coverage. There is a strong argument that supporting the deployment of deeper coverage for 4G will in itself provide stimulus for new services and also open the way to make upgrading to 5G simpler. On this basis, the provision of direct support for

[12] Trials and testbeds sponsored by industry and governments are happening across the globe.

[13] EE is used as it has the best 4G coverage. All others, and particularly O2, have poorer coverage.

deployment of network infrastructure is a consideration, particularly as it is a key component of the DCMS Future-Telecoms-Infrastructure-Review.

There is currently no 5G coverage in Wales (although EE and Vodafone have made an announcement of an intention to invest in Cardiff) and only a sparse few IoT test sites in urban areas. This will change over the next three to five years with commitments by operators to extend coverage and services, but this will only be to major Urban areas[14]. There remains a strong case for the City Deal to have an objective to accelerate the roll out of 5G services and to play a leading role in demonstrating the benefits and innovation[15] that next generation wireless services offer.

Next generation mobile service primarily relates to 5G and IoT, although in all 5G cases the option of utilising 4G-Adv may be appropriate[16]. As this dimension of the Digital Infrastructure is dealing with new services and new use cases, currently there is little evidence on which to estimate their socio/economic impact.

The focus is then to use a limited number of interventions to accelerate deployment of 5G in localised areas and thereby prove the market such that further investment by the mobile operators to provide wider 5G coverage is encouraged. By taking this approach, it will be possible to deliver evidenced based increases in productivity, innovation, skills and knowledge transfer.

Due to the fact that 4G-Adv and 5G coverage will be deployed in hot-spots, either by the operators, or as part of Digital Network intervention, drawing out widespread economic impacts or uplifts to GVA is very challenging and will have a high degree of uncertainty. In order to remove or mitigate that uncertainty, the outline business case lays out a selection of possible projects to be supported. Specific projects have not been identified but those undertaken will act as a proof of concept against which decision about further investment by the operators, or in cooperation with CCRCD, can be made. In order to open 5G and IoT use cases and projects to the widest audience, a challenge fund is proposed through which innovation can be stimulated. Potential topics are:

- Support for Digital Sector related projects within the City Deal, such as automotive, life sciences, creative industries, IT, semiconductors and financial technologies
- Fixed Wireless Access for difficult to reach communities, ‘Wireless fibre’ for ‘last-mile’ distribution of digital services
- Education related use cases, distance learning and augmented reality
- Digital transformation in industry, additive manufacturing, distributed design
- IoT demonstrator in logistics and supply chain management

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[14] Statements by all mobile operators support this as their strategic intent. The head of BT even challenged the need for 5G

[15] In line with the DCMS funded 5G Urban and Rural Connected Communities initiatives

[16] The selection of 5G or 4G-Adv is entirely dependent of the Use Case being addressed. 4G-Adv will in the large majority of cases be cheaper to deploy than 5G

In all cases, projects under 5G or IoT will need to have a separate business case developed for them, with the digital connectivity being provided acting as the key enabler for transformation and innovation.

Existing arrangements

Ofcom has identified several intervention actions that it is putting in place, particularly through additional obligations for 4G coverage as part of any operator's bids for new spectrum. It is indicated that there will be specific geographic targets set for Wales.

The Welsh government is considering ways to intervene in the market and is proposing to select fifty of the worst areas covered by 4G services in Wales for some form of intervention, consultations on this are taking place now. Timescales and selection mean that this is unlikely to impact the region strongly.

Through the emergency services network contract with EE, there is an ongoing programme of network coverage expansion to meet the critical needs of the services. Current information is that 35 sites have been delivered and another 37 are planned across Wales, with a total of 86 sites over the next two years.

In terms of 5G, DCMS on behalf of the UK Government is operating several funded testbeds and trials. At this time, only a small-scale project (5Grit) is operating within Monmouthshire in the CCRCD region. In the next few months, DCMS is to launch another bidding opportunity for 5G under their Rural Connected Communities. The details of this are yet to be announced, but the rural 5G interventions planned under Digital Networks may all fit the requirements to be included and to receive funding support.

For IoT, there are a few small-scale networks deployed within the public sector as test cases, at proof of concept stages. The networks being used are in some cases proprietary or specifically designed for IoT. However, there is an emerging case for IoT to be supported by 4G and 5G networks[17] as a preference as they are or will be ubiquitous and offer low cost connectivity. There appears to be no stand out success to date. Within the private sector, there is very little information related to their deployment, but there remain strong use cases for the industrial sectors in the region that can be explored and exploited.

Business needs – current and future

The overarching objectives of the CCRCD must be to improve 4G coverage in the region for large and small communities and to reach 90% or more[18] geographic coverage. For 5G, it is to accelerate deployment of coverage to match or exceed that in the UK. It is also to provide market confidence in deploying 5G widely through strong demonstrations of commercially successful use cases.

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[17] Current IoT is based around 4G, LoraWan, NB-IoT, Sigfox and others. All have the same functionality, but offer different advantages

[18] It is recognised that the terrain in the region is challenging and achieving 100% geographic coverage would require significant investment with no real return.

A critical need to underpin network and service deployment is to enhance the demand and the skills in the region. The Use Cases around 5G are in their infancy and offer significant opportunity in creating new jobs and services. Innovation will be what determines the beneficial use of this technology, particularly with it being considered a GPT. Interventions that involve the supply side must therefore also include ways in which to gain skills in the technology itself but also in supporting different sectors in their digital transformation journeys.

The leveraging of all the intellectual and physical assets within the region will be an important differentiator and capturing this must be a key objective and need.

Potential scope and service requirements

The core scope for the project is the 5G deployments. This is simply because, without intervention through Digital Networks it is very unlikely that 5G will be deployed outside of Cardiff City Centre.

A desirable scope would be to see the coverage of 4G increased to at least that in England. In many ways the provision of fixed broadband at Superfast speed provides the majority of benefits under the Digital Networks heading, 4G simply adding mobility to the benefit range, which in a rural setting is probably a marginal case and not worth pursuing.

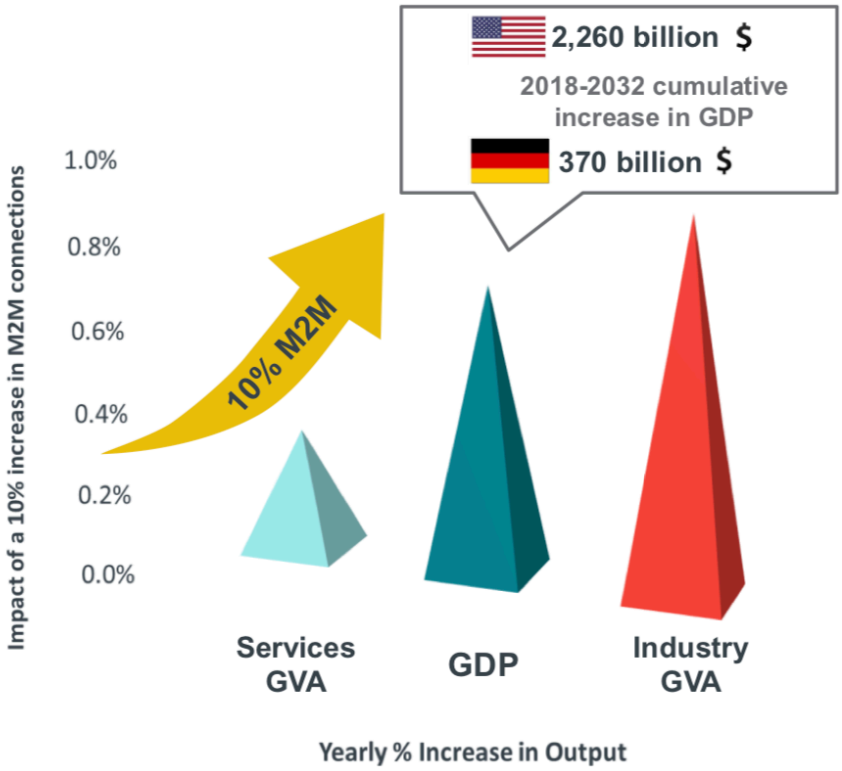
For IoT, 4G and the other network types can all be utilised in small scale PoC projects, established under the challenge fund.

Main benefits and risks

It should be noted that there is only a small body of evidence around the impact of 4G and none related to 5G, simply because in the case of 4G it is a relatively new technology and only adds mobility to the services available through fixed and WiFi services. For 5G, despite the hype, there is currently no concrete evidence. For this reason a very conservative multiplier should be adopted within the 5G & IoT segment. Recent research by the EU and Sonera suggest that every pound invested in 5G will results in a positive economic impact of £1.5 over 15 years. This is highly conservative. If the hopes for 5G do come to fruition, then this multiplier is probably understated by a factor of ten.

As an example on the interpretations of growth to be generated although for IoT very few deployments have clear impact assessments published the forecasts are extremely positive a general assessment has been made and gives:

Figure 4 - Estimated growth in IoT



This is not a true measure, but an estimate of the impact that IoT (or M2M) will have. It should be kept in mind that there is a very low base of M2M connections currently, so the increase is very close to a standing start.

The Internet of Things, (IoT), offers significant gains in efficiency and effectiveness across many sectors. The deployment of IoT is currently in its early stages with multiple types of connectivity being promoted, that said, it is likely that 4G and 5G will become the dominant means of connection. IoT with its attendant data analytics is a powerful engine for improvement across multiple sectors. However, coupling this with Open Data sources, such as those held in the public sector has the potential for high impact digital transformation in the public and private sector.

The primary risks associated with the 5G and IoT are given in the Table below;

Risk	Mitigation
Resources constraints	CCRCD will require a dedicated Digital team to manage the range of interventions envisioned. This will include, funding applications, procurements, stakeholder liaison, supplier engagement and interaction with external national and regional schemes
State aid challenges	Clearly defined legal and regulatory guidance required to frame selected options and activities
Intervention timescales under Digital Infrastructure exceed five years due to governance or management issues	Prioritise actions within the Commercial and Management case to ensure benefits are delivered against early adoption
Demand side interventions are not fully harmonised with connectivity interventions	Ensure project plans have clear timelines and actions that recognise the interdependency with demand side stimulation. Extend the skills and training remit within the City Deal to encompass supporting digital transformation and innovation
Use Cases are not well defined and benefits are not specific	Ensure a simplified 5 Case model is used to draw up the business case for each project to be supported under Transport Corridors. Assessment should take a wider view related to achieving proof of concepts and market demonstration
Levels of skills around digital innovation and transformation within SMEs mean that take-up is low.	Extend the skills and training remit within the City Deal to encompass supporting digital transformation and innovation of use cases making us of the Digital Infrastructure
5G network availability fails to attract other uses once deployed, the initial project being the only user	Utilise demand side stimulation and innovation support to exploit the availability of 5G services across the SMEs
Digital Infrastructure is delivered in a fragmented way, lessening the impact and the leverage that could be achieved	Make the interdependencies between the intervention types clear and include these within the critical success factors

Table 9 - Risks & Mitigation

Constraints and dependencies

The constraints are bound within the CCRCD governance procedures. In summary, spending is to be match funded by the private sector and spending is to target capital investment and not operational costs.

However, in the case of digital connectivity there is likely to be a cost associated with the management of the project by a dedicated team within CCRCD. It is also very likely that in the rural dimension of 4G, some of the spending options to deliver infrastructure will require significant grant funding, with little likelihood of achieving a claw-back should the revenue generated by the infrastructure becomes net positive to the supplier. There are also serious concerns over how State Aid would be viewed in connection with 4G, at this time there are no precedents.

In terms of the dependencies, these are more aligned to co-investment opportunities with mobile operators rather than true dependencies. There is a large demand across the UK for mobile operators to become involved in similar interventions, which may make it challenging to get interest from the telecoms sector. The availability of capacity in 5G deployment and skills could be a strong dependency.

2.2.5 **Open Data**

Spending Objective

Creation of a fully Open Data environment making all of the vast amount of publicly held data (with the exception of certain data, for example sensitive personal data) available will drive enhanced competitiveness and innovation. If this data is supplemented by the new data sources that will become available through public and private sector IoT deployments, it will represent a significant asset. Key actions will be necessary in order to seize the opportunity.

- Adopt a common platform through which data sets will be made available
- Set out a timetable and plan to identify all data sources, including new data sources that will enhance services or commercialisation
- Work with SMEs and local companies to develop beacon Use Cases, including the data sets required to make them successful
- Prepare a commercialisation roadmap and structure for Open Data sources (DataCo)
- Select a small number of Use Cases (Via a Competition) to support through to a PoC and full commercialisation
    - Use Cases should be a reflection of priority sectors and services
        - *Transport*
        - *Health Care*
        - *Sensing CCRCD*

In recognition of the opportunity, an Open-Data Working Group has been formed across CCRCD with the aim of exploring options and approaches to Open-data. It is fair to say that across Europe and the UK the approach varies from placing as much data as possible into the public domain to allow free reign to users and entrepreneurs

to exploit the information, to selective commercialisation of key components of data sets. At the moment, there is no accepted 'right-way' to the delivery of Open-Data. However, one lesson that has been learnt is that once data is made open, its value falls rapidly if it is not maintained and curated. Maintaining data and curating it is often not a priority and does not naturally get a follow through from publication, it is also a constant cost. Because of this, many ventures into new ways of using information and providing value-added services using it have faded away. One of the primary spending objective is therefore to find a way in which Open Data can be sustained over a long period and is not seen as a simple publishing exercise in the hopes that it becomes valuable to someone.

The supporting actions necessary to enable and encourage the deployment and commercial use of Open Data are;

- Pursue a general Open Data strategy with a primary aim of supporting digital transformation in service delivery
- Develop a data asset register so that all data sources and their content are identified and understood
- Formulate a number of Use Cases that involve Private Sector partners to access and utilise data for the benefit of citizens and to drive commercial success
- Support local businesses in the skills needed to work in the informatics and analytics sector19 thus enabling new uses for Open Data sources within CCRCD
- Harmonising efforts with others in the informatics and Analytics space such as Academia and NHS

Existing Arrangements

For Open Data, this is a public sector initiative and involves all of the ten Local Authorities in the City Deal. Progress in planning and organisation has begun, but more development is necessary. Use Cases in the region for the data that could be made available are in their infancy. This is typical across the UK, but the UK is seen as a leader in Europe:

[19] Some companies within the region are already successful in this area, such as AMPLYFi

Scope and service requirements

The development of an Open Data platform and services is a long-term undertaking and so must be planned over a 5+ year timescale. The processes of;

- Identification
- Cleansing
- Content Creation
- Publishing
- Maintaining
- Curating through to retirement

Need to be fully developed and deployed through a commitment of time and resources. This longer-term requirement and the anticipated exploitation of the data that is made available suggests a dedicated and commercially skilled team is necessary for its success in a developing market. Indeed, the Open Data concept is centered on the beneficial use of multiple data sets in areas and purposes as yet undefined. In order to undertake the development of Open Data, it will be necessary to;

- Set up a CCRCD wide function, (Internal, JV or Commercial entity) to engage with all sector players to identify the Data Sets that can be made available and to be prioritised, (Public/Transport/Health etc.) each sector then encouraged to make these available in a downloadable format
- Above, plus Operationalise the availability of Data Sets within CCRCD, identifying the initial set and progressively add sets to the volumes developed
- Above, plus Develop a platform on which all Open Data sets can be made available, leaving its use and monetisation to the market
- Above, plus Formulate five internal Use Cases to take to PoC stage using Open Data

- Through the development phase plan and formulate a JV with Private Sector players to exploit Open Data in its widest interpretation within CCRCD for commercial use
- Plan to achieve a break-even context with the commercialisation actions with the cost of maintaining, curating and developing new data sources

Main benefits and risks

The use of data to improve services has long been understood[20] and there are good examples in the public and private sector of how benefits can be realised. However, the innovative use of combined data sets that deliver more integrated and value-adding services is still in its infancy. Of particular interest to the region;

- Door to door journey planning integrated with location-based services, stretching into real-time projections of patients and people arriving for set appointments.
- Provision and hosting of data related to tourism that can be coupled with the above to improve access and offer visitor information through augmented reality type services
- Extending augmented reality above to assist logistics and wayfinding in public spaces, particularly hospitals and health centres
- Integrated data sets to support the deployment of digital services and infrastructure, (InfraCo as identified in 5G and IoT)
- Services to the private sector to support inward investment and economic investment through analysis and modelling
- Providing information to support the creation of 'Digital Twins' for everything from cities to supply-chain management

The true panoply od use cases is only beginning to emerge, but it is clear that there are significant opportunities to develop innovation and to create new wealth creation, both intellectual and capital.

[20] From Google to train timetables and booking tickets to maps of cycle paths in local areas

The primary risks associated with the Open Data are given in the Table below;

Risk	Mitigation
Resources constraints	CCRCD will require a dedicated Data team to manage the range of interventions envisioned. This will include, funding actions, procurements, stakeholder liaison, supplier engagement and interaction with external national and regional schemes
State aid challenges	This area does NOT seem to be one that has state aid restrictions. However, the support of local SMEs in the development of new data services will be within an environment of extremely large organisations who's core business is the capture and manipulation of data
In a fast-paced environment, actions exceed five years due to governance or management issues	Prioritise actions within the Commercial and Management case to ensure benefits are delivered against early actions and adoption of new services
Local Authorities fail to participate in a concerted and structured plan to deliver Open Data resources – a fragmented approach emerges	Strengthen the Open-Data forum that has been put in place with a clear plan to deliver early wins and to plan for a commercialisation of the data resources and the supporting organisation
Open-Data seen as a cost that is to be kept as low as possible to achieve the minimum necessary compliance to Open-Data commitments	Identify specific goals and timeframes to meet the, along with a fully costed and resourced plan to deliver them
Use Cases are not well defined and benefits are not specific	Ensure a clear Open-Data model is used to draw up a business case for each of the process outlined. Initial goals should take a the view that achieving strong proof of concepts and market demonstration is the gateway to further investment and intervention
Levels of skills around Open Data and transformation within the public sector and SMEs mean that innovation is low and delivered actions are weak.	Extend the skills and training remit within the City Deal to encompass Open Data supporting digital transformation and innovation
Commercial exploitation is slow and fails to provide ongoing support to the costs of providing the Open Data sources	Utilise demand side stimulation and innovation support to SMEs and the education sector. Specifically target

	incubation centres for analytics and data exploitation
Digital Infrastructure is delivered in a fragmented way, lessening the impact and the leverage that could be achieved with Open Data	Make the interdependencies between the intervention in Digital Infrastructure clear and include these within the overall critical success factors for the City deal

Constraints and dependencies

The data sets that have been created are unlikely to have a common structure or Schema. The achievement of a common base for the various data sets within the public sector participants and also future private sector contributors is an early goal. Without a common approach, the provision of Open Data will be sub-optimal and far else efficient leading to higher costs and a poorer business case for exploitation.

The necessary skills in the development and delivery of Open Data and its further commercial exploitation is beyond the current ones within Local Authorities. However, there are both public sector (Data Cymru) and private sector (AMPLYFi) that could be harnessed and integrated into an early exploitation model. The supply of people with data and analytics skills from the key universities should be further developed to ensure a good supply of skills and innovation into the near term future.

3 Economic Case

3.1 Introduction

The outcomes from the strategic case are to ensure that:

- Cities and development zones have access to world class full fibre infrastructure to deliver economic growth and inward investment
- CCRCD is at the forefront of development and roll out of world class wireless technologies
- There is equality of access to digital connectivity across the region
- The region is a leader in open data provision and usage
- Maximise the impacts and benefits of other separately funded programmes to ensure they are fully integrated and complimentary to City Deal interventions and investments

The original scope of the outline business case identified eight project themes that represent the long list of potential opportunities. Through a series of analysis and workshops these themes have been prioritised and redefined in light of the strategic case as shown in the table below.

Strategic Objective	Business Case Theme	Long List of Potential Options
Full Fibre Provision	Regional Connectivity	• Do Nothing • Supply side engagement • Fully or partially fund asset (duct) build • Full Fibre procurement
	Global Connectivity	• Do Nothing • Lease links • Support Welsh Govt Trunk Road Initiative
	Welsh Connectivity (IX)	• Do nothing • Investment and reposition • Relocate
Stimulate innovation through the delivery of enhanced wireless infrastructure.	5G	• Do nothing • Targeted investment to extend cellular coverage • Targeted investment to demonstrate innovation and proof on concepts • Supply side engagement • Telecoms Infrastructure Review
	Sensing CCRCD	• Do nothing • Innovation framework • Targeted investments
	Wi-Fi	• Do nothing • Subsidised deployments
Facilitate equality of access – Rural Broadband Provision	Community Fibre	• Do nothing • Investment in Community projects • Supplement Welsh Govt Initiatives • Demand stimulation • Fund community programmes • Strategic supply side investments
Open Data	Open Data	• Do nothing • Working groups • Demonstration case • Establish JV

The range of potential benefits is large, and each part of the region will have a different blend of benefits to be gained through digital infrastructure investment. Hence a framework of analysis has been defined with the four streams above to facilitate the development of the economic case:

- Full Fibre
- Next Generation Wireless
- Equality of Access
- Open Data

A long list of options has been defined for each of these segments. Each of these will also have a different mix of success factors applied in the selection of the preferred option(s).

3.2 Critical Success Factors

Each of the four streams will achieve a different mix of the above overarching benefits, but they should all be considered under the critical success factors. The outcome is represented in the table below;

Benefit Outline	Full Fibre	Next Gen Wireless	Orchestration Programme	Open Data	Benefits Realisation Measure
Productivity improvements	✓ Digital Transformation enabler	✓ Digital Transformation enabler	✓ Digital Transformation enabler	✓ Digital Transformation enabler	Reduction in time across business functions Improved access for marketing and sales activities Supply chain management simplification Supply chain integration to final service or product
Innovate new business models and open new markets	✓ Digital Transformation enabler	✓ Digital Transformation enabler	✓ Digital Transformation enabler	✓ Direct stimulation to new markets and sector development	Efficiency gains through new processes Integration with customers businesses and services New territories/countries being served Adjacent products or services introduced
New business start-ups	✓ Innovation in digital services	✓ Innovation in digital services	✓ Wider opportunity base	✓ Direct stimulation to new markets and sector development	Number of SMEs created that utilise the Digital Infrastructure Number of SMEs created in digital services sectors Number of Rurally based startups Relative failure rates of SMEs
Network Building & Support Employment	✓ Civil engineering and Technical Skills		✓ Civil engineering and Technical Skills	None	Jobs created by construction companies involved in network roll out Jobs created in servicing the Digital Infrastructure Jobs created in service the Digital Infrastructure project itself
Skills Development	✓ Demand for digital skills increased	✓ Demand for digital skills increased	✓ Demand for digital skills increased	✓ Demand for digital skills increased	Increased recruitment of local education leavers into digital sector Increased engagement of SMEs with education providers Increased demand for digital skills training
New Working Practices	✓ Collaborative and distributed working	✓ Collaborative and distributed working	✓ Collaborative and distributed working	✓ Collaborative and distributed working	Increase in flexible working - time Decreased travel to and from work Supply chain integration
Teleworking to Stimulate Rural Business Models		✓ Wireless digital service access	✓ Remote working	✓ Remote working	Startups in rural settings Increase in flexible working - time Decreased travel to and from work Teleworking in Health and Social Services
Private Household Benefits	✓ Attraction to area	✓ Attraction to area	✓ Attraction to area	✓ Attraction to area	Housing demand increase Housing value increase
Sustaining Communities		✓ Teleworking and distributed working	✓ Teleworking and distributed working	✓ Teleworking and distributed working	Increase in flexible working Lower level of Urban migration Increased prosperity of local services
Enablement of 5G	✓ Access to fibre	✓ Access to fibre	✓ Access to fibre	✓ Limited	Increased penetration of 5G services
Smart Cities/Homes Infrastructure	✓ Enablement of IoT services	✓ Enablement of IoT services		✓ Direct stilulation through usage of IoT Data	Increasing numbers of Smart initiatives Direct stimulation of IoT projects in any sector
Industry 4.0	✓ Enablement of IoT services	✓ Enablement of IoT services		✓ Direct stilulation through usage of IoT Data	Increasing numbers of Industry 4.0 initiatives Direct stimulation of IoT projects in industrial sector
Healthcare Benefits	✓ Innovation in services delivered digitally	✓ Innovation in services delivered digitally	✓ Innovation in services delivered digitally	✓ Innovation in services delivered digitally	Increased Telemedicine activity Increased service delivery via digital means, (video) Decreased travel to health centres
Positive Environmental Impacts	✓ Reduced need to travel	✓ Reduced need to travel	✓ Reduced need to travel	✓ Reduced need to travel	Reduction in travel across all sectors and locations Reduction in logistics flows across the region
Social Inclusion and Removal of any Digital Divide		✓ Widespread access to advanced digital services	✓ Widespread access to advanced digital services	✓ Widespread access to advanced digital services	Increase in the number of households and SMEs taking up digital services Increase in the service quality being taken up by SMEs and households

Table 10 - Overarching Critical Success Factors

In order to give a completely rounded consideration, the critical success factors for the digital infrastructure programme should be extended to include;

Success factor	Measurement Criteria
Strategic fit	• Meets the strategic goals of the CCRCD • Delivers future proofed digital infrastructure to enable to achieve economic and social objectives • Is at least comparable with elsewhere in UK
Economic return	• Achieves a viable cost benefit ratio when compared with the other available options
Achievability	• Fits with the region's resources • Follows a clear, timely and deliverable approval route and delivery timeframe • Has political and stakeholder support across region and delivers benefits to all parties • Is fully state aid compliant and does not require new state aid applications • Is sustainable with the flexibility and scalability to serve the regions requirements as the economy grows.
Supply side	• A clear delivery model is agreed • There is supplier appetite for investment in the region
Compatibility with other programmes	• No overlap or duplication of effort with other national or regional digital infrastructure investment programmes. • Fully aligned with UK and Welsh digital policy objectives

Table 11 - Digital Infrastructure Specific Success Factors

3.3 Long List Options

This section presents the long list of options. This has been analysed and presented for each of the streams previously defined. This is because:

- The economic impacts and cost benefit ratios are different between the intervention types
- The range of options differs by stream as each has different requirements and potential delivery mechanisms
- External issues such as the role national programmes and the impact of state aid are varied across the pillars
- Supplier appetite for investment will vary across the region.

3.3.1 Full Fibre

There is a requirement for new duct and fibre infrastructure to be built in key development corridors and zones to underpin the innovation outlined in the Strategic Case.

Long List Options

Option 1 : Do Nothing
Description and Rationale: • No actions or funding provided by CCRCD. Market left to deploy infrastructure against their own investment criteria. • No co-ordination or aggregation of purchasing power of public sector in the region to stimulate additional investment
Costs: £0
Benefits: £0
Issues/Risks: • There is a risk that there will be a concentration of investment into the key urban centres of the region only. e.g. BT has announced investment programme into central Cardiff postcodes but not beyond. Other towns and suburban areas may not see investment in the foreseeable future. The impact would be negative, with limited or no inward investment and digital transformation, including digital led innovation. It would inevitably reinforce the drift of employment towards the urban areas, particularly Cardiff and Newport or outside the region. • There will be a lack of competition and choice in the region that will impact service availability and pricing • Lack of inward investment by telecommunications industry • Social loss – very limited improvement to households with access to healthcare, education, access to social care and public services from 'spill-over' to deeper fibre connectivity, • Economic loss – productivity, inability to telework, reduced employment opportunities, • Reduced ability to attract digital intensive sectors into region (e.g. media, finance)

Table 12 - Full Fibre, Do Nothing

Option 2 : Do Minimum: Supply Side Engagement

Description and Rationale:

CCRCD to proactively engage with the supply side market. Activities to include:

- Briefing industry on regional plans and requirements
- Co-ordinate public sector procurement activities
- Lobby for inward investment
- Promotion of region as test bed for new technologies and services
- Arranging site visits, events etc
- Providing single interface between industry and the regional public sector bodies and a point of contact for issues such as planning, way leaves etc
- Co-ordination of programmes with UK Govt and Welsh Government

Such activity has proven a key catalyst for inward investment elsewhere in the country and there have been examples of plans changed by operators such as City Fibre and Virgin Media. Suppliers are faced with multiple opportunities and are often responsive in their planning.

Costs:

£ 150k per annum for staffing

Benefits:

Easier to target support and to coordinate other funding channels to benefit the region and CCRCD. Increased investment by operators over and above 'Do Nothing'. Harmonisation with other initiatives such as LFFN.

To be monitored against clearly defined targets for inward investment and service provision. An indicative target could be to attract an additional £5m of inward investment stimulated over a five-year programme, plus successfully obtaining additional separate funding of £10m of public grant funding.

It should be noted that projected digital infrastructure grant funding streams from central Govt are planned to be in the order of £200m per annum across the UK with perhaps £10-£20m likely to come to Wales.

Issues/Risks:

- Limited financial exposure to CCRCD so less risk
- Time to implementation could be long, reducing potential impact achieved
- Regional priorities may be ignored
- Competition for investment from other parts of UK
- Supplier appetite for regional investment may be limited

Table 13 - Full Fibre, Do Minimum

Option 3 : Asset Investment Programme

Description and Rationale:

- CCRCD authorities to invest in duct infrastructure and/or encourage third parties to do so. Duct infrastructure to be built in key transport corridors and economic development areas
- Local policies and initiatives put in place to encourage duct build whenever regional building or transport infrastructure is being deployed
- Potential to allow third party telecommunications operators to deploy fibre in ducting to reduce deployment costs.

Costs:

- Estimated duct costs of £50-£100per metre dependent on terrain. May be reduced if sharing dig costs with other infrastructure.
- Estimated duct mileage required across key identified development zones is approx. 100km - **200 km,** giving an indicative investment range of approx. £10m - £20m

Benefits:

- Reduced cost of investment for fibre service providers seeking to invest into region
- A return on the investment can be gained over a 15-year timeline from access charges.
- Stimulate inward investment and deployment by commercial operators
- As there is no guarantee of investment by operators in laying and operating new fibre in the ducts, the economic impact is not guaranteed. If routes are carefully chosen and the roll out is staged by only preceding with phases when some commitment is given by the private sector, then a multiplier of 6 to 1 would be appropriate leading to the investment **of £10m returning of the order of £60m**

Issues/Risks:

- Ducting will have to be offered to the market in compliance with state aid regulations. Will require state aid assessment and benchmarked pricing
- CCRCD authorities may become responsible for ownership, maintenance and operation of ducting
- May be limited appetite by industry to use the ducting outside of key commercial areas
- Ducting will have to be built to a standard acceptable to the industry for use, (Carrier Grade)
- The procurement, planning and build of infrastructure is likely to be take a minimum of 2-3 years to deliver
- If CCRCD authorities are to facilitate commercial usage of the ducting a state aid opinion will need to be sought (see commercial case).

Table 14 - Full Fibre, Asset Investment

Option 4 : CCRCD Procurement

Description and Rationale

- CCRCD authorities to procure either a managed service and/or fibre infrastructure to all public sites across the defined development zones. (Note public sector sites only chosen to comply with state aid regulations). Service definition may be a blend across the region based on local requirements and commercial appetite to deliver services.
- Anchor investment by the public sector will stimulate additional private sector investment by commercial sector in area to widen access to other businesses and consumers

Costs:

- Estimated capital investment **of £20m** across region

Note this estimate in an upper ceiling based on building new duct and fibre to an indicative footprint on public sector sites in the region as developed for the regions LFFN bid. It is an upper limit on costs for Options 3 and 4 combined (e.g. if the region had investment £10m of ducting in Option 3 and facilitated commercial use of the ducting the resulting costs of commercial investment would be reduced. In contrast if no public ducting was available the commercial sector would need to invest £20m).

Benefits:

Stimulate inward investment by commercial telecoms sector into region. Experience has shown that commercial investment in a City region typically has a leverage of 6:1. Hence a **£20m** investment into such infrastructure could deliver a further an **additional £120m** of private sector investment

Enhanced service choice in the region

An analysis of direct economic benefits to only the Cardiff City area of such investment is estimated at over £200m over 15 years (source Regeneris)

In addition, Regeneris also modelled other additional indirect benefits

- enhanced ability to deliver 5G
- smart city facilitation
- industry 4.0/IoT

Issues/Risks:

- CCRCD will need to establish a procurement framework. Cost approx. £150k over a 9-month timeframe
- Funding would need to be filled by a blend of public sector and commercial contributions (NOTE in other areas of the UK some authorities have capitalised future telecoms revenue expenditure as a contribution to projects of this nature)

• The PSBA will need to deliver its services over any new infrastructure built/deployed in the region. This will need co-ordination and possible investment in new equipment and service provision • The question remains, will there be industry appetite to invest across the regions priority zones or only in Cardiff City • The procurement can only address connectivity to public sector sites to avoid the risk of state aid challenge.

Table 15 - Full Fibre Procurement

3.3.2 Next Generation Wireless

The options range across mobile connectivity and are related to coverage and capacity for 4G and 5G networks, also IoT networks which may or may not be specific to IoT services, as outlined in the Strategic Case.

Long List Options

Option 1 : Do Nothing
Description and Rationale: No actions or funding provided by CCRCD. Market left to deploy infrastructure against their own investment criteria
Costs: £0
Benefits: £0
Issues/Risks: • 4G coverage is in this case likely to improve slowly. 5G will not progress deployment beyond Cardiff City Centre until 2021 and would only reach all regional Urban areas by 2023 at the earliest. Targeted deployments to support areas of concentrations of digital sector businesses unlikely before 2023. • Gaps will remain across the region, in particular the variation in coverage between the mobile operators will continue to mean that the selection of a mobile service provider further reduces the coverage received. • Limited commercial support for the deployment of advanced mobile services in the region, so reducing the opportunities for innovation and digital transformation • This has been the situation in the region for the last fifteen years, which has resulted in the region being behind on 3G and 4G coverage when compared to the rest of the UK. In economic impact terms, there is general consensus that the absence of 4G services has a detrimental impact to consumers and businesses in terms of productivity and to job creation. However, the range of figures applied to these measures is wide and focussed on the applications 4G enables rather than the technology itself • Economic loss – Direct negative impact on productivity, GVA and consumer adoption of digital services. Reduced ability to attract digital intensive sectors into region (e.g. media, finance). Delay or frustrate the adoption of 5G enabled use cases across multiple sectors. • Environmental – reduction in carbon footprint, but likely to be small and over a long period of time

Table 16 - NGW, Do Nothing

Option 2 : Do Minimum: Supply Side Engagement

Description and Rationale:

CCRCD to liaise with mobile industry to;

- Briefing industry on regional plans and requirements
- Lobby for inward investment
- Promotion of region as test bed for new technologies and services
- Arranging site visits, events etc
- Providing single interface between industry and the regional public sector bodies and a point of contact for issues such as planning, base-stations location, asset location, etc
- Co-ordination of programmes with UK Govt and Welsh Government

Such activities have not yet been executed fully in the UK, although digital leads for fixed infrastructure do cover mobile as well. Suppliers are faced with multiple opportunities and are often responsive in their planning if they can simply access the processes needed for deployment of infrastructure, more fully understand the market they are addressing and have a good understanding of the initiative and plans of the public sector that affect the market and density of consumers.

Costs:

£200k - £250k per annum, with a cap of a five-year programme reaching £500k to £750k

Benefits:

- Easier to target support and to coordinate other funding channels to benefit the region and CCRCD. Increased investment by operators over and above 'Do Nothing'. Harmonisation with other initiatives such as Welsh Mobile Action Plan and delivering on its recommendations. To be monitored against clearly defined targets for inward investment and service provision.
- Target additional £3m of inward investment stimulated over 3 years.

Issues/Risks:

- Limited financial exposure for CCRCD
- Time to deployment may be long, reducing potential impact achieved
- Regional priorities may have to be limited to dense urban locations
- Service take-up may not improve
- Innovation in usage not addressed fully
- As there is little certainty around the impact of undertaking this option, the issues and risks around do nothing also apply. The level to which they can be truly mitigated through supply side engagement is unclear and there is little evidence other areas of the UK where this has made a difference

Table 17 - NGW, Do Minimum

Option 3 : Undertake and Extend Future Telecom Infrastructure Review guidance

Description and Rationale:

The thrust of the Telecoms Review and the Welsh Mobile Action Plan is to make it easier and cheaper for mobile operators to expand coverage and introduce new services such as 5G and IoT. Fundamentally, this requires CCRCD, along with support from local authorities to allow their physical asset usage and in addition streamlining the planning and licensing processes. A much higher degree of responsibility and autonomy would be required over Option 2, Supply Side Market Engagement. Responsibilities would include:

- Organising and supporting Local Authorities to deliver streamlined access and services to support mobile operators in building more coverage and services in 5G and IoT. In effect lowering the cost of building infrastructure and shortening the time this takes
- Briefing industry on regional plans and requirements
- Lobby for inward investment
- Lobby Ofcom and DCMS to support a more targeted approach to regulation in Wales, to assist with the specific issues around lack of investment in mobile services and coverage
- Promotion of the region as a strong market for new technologies and services
- Innovation stimulation through knowledge transfer events and information promotion
- Joint business and industry events with connectivity service providers to promote innovation and identify key development areas in which deploying 4G and 5G can stimulate growth and inward investment
- Provide market related information to support business planning processes for Mobile Operators
- Providing a highly effective and efficient single interface between mobile operators, industry and the regional public sector bodies to enable all aspects of deployment support
- Co-ordination of programmes with UK Govt and Welsh Government

Such a role has not yet been executed fully in the UK, although digital leads for fixed infrastructure do cover mobile as well. Suppliers are faced with multiple opportunities and are often responsive in their planning if they can more fully understand the market they are addressing and have a good understanding of the initiative and plans of the public sector.

Costs:

£250k - £500k per annum, with a cap of a five-year programme reaching £1.25m to £2.5m

Benefits:

Strong focus and leadership to target supportive interventions and to coordinate other funding channels such as DCSM, to benefit the region and CCRCD.

Materially increased investment by operators over and above ‘Do Nothing’ through supporting actions.

Lowering the threshold for mobile operator's investment decisions through lowering the cost of deployment and doing business in the region. In addition, leveraging the market information held by the authorities on business locations, sectors and numbers to provide better revenue forecasts for the mobile operators. Working closely with mobile operators would enhance their knowledge of the region and improve the identification of skills needed and the promotion of providing those skills from local resources. Mobile operators through a knowledge transfer programme would be made aware of other inward investment activities and job creation to inform their opportunity to enhance services and coverage to seize market share as early as possible. Promoting the ideas of infrastructure sharing, including access to fibre connectivity for backhaul services. Harmonisation with other initiatives such as Welsh Mobile Action Plan and delivering on its recommendations. To be monitored against clearly defined targets for inward investment and service provision, notably 4G and 5G coverage in key corridors, capacity and data rates comparable with elsewhere in the UK. Increasing the effective choice of mobile service providers, notably in rural areas by having competing deployments. Bringing together the support function for all ten local authorities will provide significant economies of scale and allow a central source of skills and capability to be developed that would be beyond any single authority to achieve Additional £7m of inward investment stimulated after 3 years.
Issues/Risks: • Limited financial exposure for CCRCD • Participation of all ten local authorities necessary, alongside a significant uplift in local skills and expertise • Local Authority willingness to cede some responsibility and delivery to CCRCD to support mobile operator's deployment of networks, including information and access to infrastructure assets • Local Authorities undertaking this type of action individually[21] would miss significant efficiency gains by having a single central team and likely mean that skills overall would be lower. • Single point through which to do business not consistent, caused by variability in local authority engagement

Table 18 - NGW, FTIR

[21] The FTIR document set seems to anticipate that Local Authorities would act individually. This would be very inefficient for the region.

Option 4 : Funded Intervention to extend 4G coverage

Description and Rationale:

Work in conjunction with the mobile operators to gap-fund mobile services in areas with poor indoor and outdoor coverage. Utilise a model similar to that being proposed by the Welsh government under their Mobile Action Zones. Organising and supporting Local Authorities to deliver streamlined access and services to support mobile operators in building more coverage and services in 4G, including the public sector building radio access infrastructure (towers, roof-top sites and ducting) and offering these to operators under a site sharing regime to simplify and reduce the operators cost base. This would include:

- Providing single business interface between industry and the regional public sector bodies and a central resolution point for issues such as planning, wayleaves etc. Duplication of Option 3
- Co-ordination of intervention programmes with UK Govt and Welsh Government
- Providing Capex and Opex funding to support loss making 4G sites in terms of their usage and data throughput. This could include;
- Upgrading 3G sites with new 4G equipment, accelerating deployment
- Building new passive infrastructure sites, (towers, mono-poles and roof-top sites)
- Deployment of 4G active equipment to new sites
- Building new duct work to support fibre links to sites

Costs:

Costs: £250k - £500k per annum, with a cap of a five-year programme of £1.25, to £2.5m for the internal team (Option 3).

Capex for infrastructure costs would range between £30k and £150k per site and be additional, assume 100-300 macro sites = £10m - £30m.

Benefits:

Increased investment by operators by lowering their threshold in terms of direct costs and the cost of doing business in the region for Mobile operators.

Harmonisation with other initiatives such as Welsh Mobile Action Plan, Mobile Action Zones and delivering on its recommendations.

To be monitored against clearly defined targets for inward investment and service provision, reflected in coverage improvement across multiple mobile operators and service enhancements to 4G-Adv.

This could be delivered over a 3-5 year window and hence quickly reduce the timescales in which parts of the region are likely to be a not spot.

Additional £30m of inward investment stimulated after 5 years.

Issues/Risks:

- Currently the Mobile Action Zone consultation documents would indicate that there is a need to build a large number of sites. This is based on latent demand, NOT areas with poor coverage, 11 sites have been identified within the region as in need of further investment to gain better coverage and capacity.
- Funding would need to be flexible, as any infrastructure to be built by the public sector would need to have a fixed tenancy agreement from one or more mobile operators, take up is therefore uncertain.
- Any infrastructure asset constructed by the public sector would need to be 'Open Access' and would represent an asset that would be expected to make a return. If sites where rented to mobile operators at a market rate (which may be a requirement under state aid) then the real savings to mobile operators would represent a cash-flow impact, not a true cost reduction, their interest is therefore questionable.
- Agreement on where to build new infrastructure assets may be difficult to achieve, Operators would in all cases seek to maximise a return on their investment, resulting in current not-spots remaining, as there is no investment case for the operator even with support.
- The Emergency Services Network already has a programme of extending 4G coverage and supporting the building of infrastructure in terms of Macro base station sites. There is an opportunity to work closely with this programme to encourage a wider extension to the coverage provided.
- Active equipment within the network being funded is an asset that could achieve a return through customer usage increasing.
- Investment in active equipment would need to carefully be considered as it could breech state aid rules by benefiting a single supplier. Making active equipment 'Open Access' is highly problematic in terms of the current business model operated by mobile operators and the fact that spectrum is licensed nationally and by each operator.

Table 19 - NGW, 4G Intervention

Option 5 : Support for Specific 5G/IoT Projects

Description and Rationale:

Work in conjunction with the mobile operators to operate a risk-based, gap-funded, mobile services in areas where there is a good use case to demonstrate the commercial and innovation impact of 5G/IoT. This option should be undertaken in conjunction with Option 3. Gap funding would be on the basis of joint investment in infrastructure and active network equipment and involve either a competitive process or partnership with a mobile operator on a case by case basis.

Purely as an example of projects that should be considered, shown in the following table as 5G and IoT opportunities:

Project	Example Use Cases	5G	IoT	4G Adv
Creative Digital Clusters	Media and content Cloud services	✓	✗	✗
Rural 5G Fixed Wireless Access delivering 'Wireless Fibre' Services	Teleworking Digital Health	✓	✗	✗
Innovation Hubs	Media & Content Non-Specific Fast Connectivity	✓	✗	✗
Rural Working TechHub - PoC Made as additional to 5G FWA above	Teleworking Digital Sector SME Innovation Digital Sector SME Growth	✗	✓	✓
Internet of Energy	Smart Grid Smart Home	✗	✓	✓
Smart City	Smart Transport Smart Home Smart City	✗	✓	✓
Industry 4.0	IoT Sensor Array - Specific Control - Specific Data exchange - Real Time	✗	✓	✗

(4G Adv is an alternative to 5G where the use case is less demanding and it can be deployed at a much lower cost).

It should be very much kept in mind that this is an example list and others can and will be added. However, it is a reasonable place to start. It should also be kept in mind that 5G is one enabling digital service, in almost every case Gbs fibre connectivity and IoT services will co-exist and will leverage each-others performance in digital transformation. All of the networks deployed will also be open for other use cases to exploit, they are in no way dedicated to a single project function or service delivery, they remain public-open networks exactly as current 4G and 3G networks.

Costs:

£250k - £500k per annum for the digital team managing the intervention, assuming a five-year cap gives, £1.25m to £2.5m.

Gap funding of between £300k and £500k per project depending on the technology being deployed and assuming match funding from industry for each location. Assuming five core CCRCD projects, plus a further ten proof of concepts, a total investment of £7m plus the team at £2m is required to give a total of circa 9m.
Benefits: Enable supported projects to fully reach their potential while acting as Proof of Concept for 5G and IoT. Accelerating the deployment of 5G and IoT will have a positive impact on inward investment and the growth of digital clusters where it is present. Focus initially on the core CCRCD interests to ensure they reach their maximum potential in terms of technology enablement, plus a further ten projects of mixed 5G and IoT within key zones of; manufacturing, transport, energy and health. Assuming match funding, industry would invest £7m.
Issues/Risks: Each project supported would have its own set of risks and issues that may not be dependent solely on the provision of next generation wireless connectivity. In effect if any project does not have a positive business case for the overall benefits it will deliver, the deployment of 5G or IoT services is unlikely to change the position to a positive business case, in which case the digital infrastructure would not be supported and deployed. Limited financial exposure for CCRCD as only deployed against a separate business case. This approach would support both innovation and challenge aspects of the CCRCD.

Table 20 - NGW, 5G & IoT Support

3.3.3 Facilitate equality of access – Rural Broadband Provision

As discussed in the strategic case there are a range of both national and Welsh Government Initiatives to address requirement to in-fill rural broadband coverage. However, it is likely that there will remain a significant gap in service provision in the region, even after the role out of Superfast Cymru 2 and Rural Gigabit Connectivity interventions.

Hence it is not proposed that these actions are replicated. Instead the long list of options for CCRCD should be complementary to national programmes and are;

- Do nothing
- Supply side engagement
- Demand stimulation
- Strategic supply side investments

Long List Options

Option 1 : Do Nothing
Description and Rationale: No actions or funding provided by CCRCD. Market left to deploy infrastructure against their own investment criteria, or with support of the UK and Welsh Governments programmes
Costs: £ 0
Benefits: £ 0 (NOTE: Provided the DCMS USO and Superfast Cymru 2 interventions take place, in themselves they will produce a positive economic impact. Typically, an investment into a rural site produces a benefit: cost ration of 3.5:1 over 15 years. Hence if the number of white premises was reduced by 10,000 at a cost of £3000 per site, the economic benefit can be expected to be over £100m over 15 years.
Issues/Risks: • There will be a risk of deepening the digital inclusion gap across regions • No local control of priorities – dependent on industry and national initiatives • Lack of inward investment. Elsewhere in the UK public sector intervention has resulted in leveraged commercial investment. • Social loss – percentage of households with limited access to healthcare, education, access to social care and public services will increase but potentially very slowly, leaving some areas with no or minimal connectivity • Economic loss – lower productivity, inability to work in flexible manner, reduced employment opportunities • Environmental – increased carbon footprint, or certainly limited decrease

Table 21 – Equality of access - Do Nothing

Option 2 : Do Minimum: Supply Side Engagement

Description and Rationale:

CCRCD to proactively engage with market. Activities to include:

- Briefing industry on regional plans and requirements
- Lobby for inward investment
- Arranging site visits, events etc
- Providing single interface between industry and the regional public sector bodies and a point of contact for issues such as planning, way leaves etc
- Co-ordination of programmes with UK Govt and Welsh Government

Costs:

£ 100k - £150k per annum

Benefits:

Easier to target support and to coordinate other funding channels to benefit the region and CCRCD. Increased investment by operators over and above 'Do Nothing'. Harmonisation with other initiatives such as Welsh Mobile Action Plan, Superfast Cymru and DCMS USO.

To be monitored against clearly defined targets for inward investment and service provision.

Target additional £5m of inward investment stimulated over the five-year programme plus successfully obtain £10m of public grant funding

Issues/Risks:

- Limited financial exposure to CCRCD
- Time to implementation could be long, reducing potential impact achieved
- Regional priorities may be ignored
- Service take-up may not improve
- Competition for investment from other parts of UK
- Supplier appetite for regional investment may be limited
- The most remote, commercially challenged part of the region will be difficult to attract inward investment to. As a result, such areas will fall further behind the rest of the UK.

Table 22 – Equality of access, Do Minimum

Option 3 : CCRCD Demand Stimulation Programme

Description and Rationale:

CCRCD establish a local programme to increase user awareness and significantly improve adoption of digital services across the entire population of SMEs and households, from circa 40% to 60%. Activities would include:

- PR and promotion
- Establishment of case studies of benefits and usage
- Engagement with local stakeholders such as business groups, community organisations etc
- Events
- Promotion of connection voucher schemes of UK and regional Govt
- Engagement with suppliers
- Engagement with local businesses and residents
- Support and training programmes
- Use of social media
- Web based support
- Provision of technical, commercial and legal support to community groups

Costs:

- Local central team of 5 staff, £300K per annum across the region. For a five-year programme, £1.5m
- Additional promotional materials and support, £250- £500k per annum
- To be monitored against clearly defined targets for inward investment and service provision. For example, additional £5-6m of inward investment stimulated over the five-year programme (33,000 @ £5k per premise)

Benefits:

Key measures of success will be monitored on an annual basis and will include:

- service adoption by business and residents
- business productivity
- employment and start up rates

Target an additional 5% uptake in Next Generation Broadband Access services over 5-year period?

Research commissioned by DCMS the economic, social and environmental impacts of faster broadband – UK Economic Impact Study. Economic benefits identified were local enterprise employment, teleworker productivity, productivity growth, labour force participation and network construction. Enhanced productivity is the key productivity with benefits growing by 0.3% as speeds double. A more direct comparison of the proposed CCRCD intervention is the Impact Analysis undertaken for the Universal Service scheme. This analysis discounts benefits due to the nature of the programme under a range of speeds and subsidy scenarios. However, all options deliver a positive outcome and value for money (over 15 years) with a Benefit Cost Ratio of between 3.4 to 3.6

Issues/Risks:

- Limited financial exposure to CCRCD
- Time to implementation could be long
- Service take-up may not improve
- Need for co-ordination with national and regional schemes
- Demand stimulation only serves to increase take up in those areas that have infrastructure to take up. There will still be parts of the region without any infrastructure and demand stimulation does not address their requirements or lead to infrastructure investment.

Table 23 –Equality of access, Demand Stimulation

Option 4 : CCRCD undertakes strategic investments in service providers and operators

Description and Rationale:

It is likely that the existing proposed national and regional initiatives will still leave a number of SME and residential premises un-served or poorly served. This is because:

- Welsh Government Superfast Cymru 2 lacks the funding to achieve ubiquitous coverage
- Superfast Cymru 2 targets an uplift in connectivity speeds to at least 30Mbps . It does not prioritise premises beyond this. Hence industry response is to target premises with the lowest upgrade costs which may lead to premises with broadband services but below the threshold speed being prioritised over those with no services at all.
- DCMS programmes are dependent on proximity to public sector sites. This is a state aid issue. DCMS does not have a state aid clearance for its LFFN programme and hence can only fund connectivity to internal public sector sites which is a 'no aid' measure
- USO schemes will provide funding for in-fill but details of the scheme are yet to be announced, including the funding limits and how they will be deployed locally
- The number of premises in the region to be addressed following the impact of these schemes estimated at 10000 premises

Hence there will remain opportunities for emerging service providers to target this untapped segment using radio technologies and the reuse of Openreach duct infrastructure where available.

CCRCD has already received a number of approaches from such services for investment capital

Costs:

Superfast Cymru 2 is likely to primarily address the 'low hanging fruit' i.e. those sites that are cheapest and easiest to serve in urban centres. The outlying 10000 sites are estimated to have a typical cost per site of £5000. This would result in a capital funding requirement of >£50m.

Hence a Challenge Fund of £10-£20m could be established for equity investments in service providers. This would give a financial return to CCRCD and enable social divides and equality of access to be achieved.

Benefits:

Economic benefit impact analysis undertaken as part of the audit of rural broadband programmes range from;

- The DCMS UK Economic Impact Study concludes that every £1 invested in broadband delivered £20 in benefit over a 15-year period.
- A similar analysis by the UK Govt for the Universal Service Obligation scheme presented a cost benefit ratio of 3.5 to 1 over 1 years.

Within the assessments, economic impacts identified include local enterprise employment, teleworker productivity, productivity growth, labour force participation and network construction.

In addition, a range of social benefits also accrue including; reduced travel time, access to education, improved health, consumer access to e-commerce, enhance employment opportunities, rural community resilience and environmental benefits (e.g. reduced emissions).

Hence an aggregate intervention of £20m by CCRCD is likely to deliver positive benefits of approx. £70m to the region

The other key benefits of such an approach are;

- Speed of delivery optimised against local priorities
- More control over local actions

Issues/Risks:

There are two major issues/risks

- ensuring any CCRCD actions are seen as complementary to, and not competitive with, other national and regional programmes and there is no overlap or duplication of finance or effort. This will require co-ordination with the UK and Welsh Government
- State Aid: The telecommunications market is highly regulated with strict state aid regulations
- The rural broadband segment is financial challenging as the most costly and difficult to reach parts of the market remain to be addressed. Hence detailed due technical and commercial diligence is required.

Table 24 – Equality of Access Funding Streams

Option 5 : CCRCD Community Programmes

Description and Rationale:

A number of communities have collaborated to define and procure their own telecoms infrastructure or establish themselves as a micro service provider in their community. Such activity has been supported by public funding schemes (e.g. Community Broadband Scotland). The Welsh Government is also defining a Communities Initiative. In addition, support and guidance can be provided in areas such as procurement, legal support and state aid.

Costs:

Typically, grants are made available to a community. These may range from small grants of a few thousand pounds to undertake feasibility studies to grants for connection and installation. This is a function of the number of premises connected and community size but across other parts of the country typical community grants were low hundreds of thousands pound per community with some rare larger exceptions. The Scottish Government spent £6.4m supporting 64 communities but in practise only 13 of these are fully operational.

A modest fund in the region of £1m could be allocated to a CCRCD community programme but MUST be complementary to any other funding interventions from national or regional bodies, and be complemented by technical, procurement and legal support to be effective. The support function should be limited to a team whose cost is capped at 20% of the fund.

Benefits:

The benefits are focused on speed to service provision for the most rural communities. However, there are few success stories in this approach.

Issues/Risks:

All existing initiatives of this nature site challenges;

- There are limited (if any) communities in the region prepared for such a scheme
- State Aid rules apply to all projects irrespective of grant amount (even de-minimis) and state aid schemes are not suited to small community projects
- Empowering communities should not imply communities leading procurements. It is challenging to expect communities to be responsibility for public sector procurement rules and CCRCD support will be required here.
- Projects need to happen alongside a national and regional programme. Agreeing scope with national projects can be complex and sensitive: who (and when) agrees a de-scoping of an area from the national programme for local investment?
- What is the appetite of local communities for bespoke projects involving potentially small ISPs (no choice of national providers)?
- Engaging with communities is essential to identify projects suitable for the fund, but engagement with the market to understand appetite in delivering to small communities is critical
- There is a high failure rate with such schemes due to administrative complexity, low supplier appetite, a lack of resources and skills and the challenges of on-going operation and management.

• Importance of management of communication and expectations with communities (timescales, funding, solutions, ISP choice …)

Table 25 – Equality of access, Community Programmes

3.3.4 **Open Data**

As discussed in the strategic case there are a range of both European, UK national and Welsh Government Initiatives related to Open Data. However, the delivery of Open Data, and much more importantly, its long terms sustainability and support for driving GVA growth, requires a structured and commercially focussed effort.

The long list of options for CCRCD should without doubt be complementary to national programmes but must also seek a new way forward to drive uptake, usage and success in the opportunities offered around data and analytics;

- Do nothing
- Making Data Sets Available
- Centrally organised Open Data
- Open Data and Open Market creation
- Implemented PoC
- DataCo

Long List Options

Option 1 : Do Nothing

Description and Rationale:

No actions or funding provided by CCRCD. Local Authorities and the wider market left to deploy Open Data against their own investment needs or under compliance rules, or with the support of the UK and Welsh Governments programmes

Costs:

£ 0

Benefits:

£ 0

Issues/Risks:

- There will be a risk of fragmented delivery and uptake
- No local control of priorities – dependent on industry and national initiatives when they emerge
- Reduced or no inward investment.
- Social loss – innovation in public services will be slower and limited
- Economic loss –reduced employment opportunities and no development of new high value jobs

Option 2 : Making Data Sets Available

Description and Rationale:

Primarily in the formation of a small team dedicated to developing the data sets within CCRCD by engaging with the a wide number of sectorial players, to establish the data sets and timelines for their availability

Costs:

£ 200k/Annum

Costs are estimated as a team of 3 per annum. High costs are assumed as a high degree of professional and technical skills needed. Resources needed are minimal and considered as normal tools for technical staff.

Benefits:

£ 0

Benefits will vary considerably as provision of data sets is supported, but the uptake of data usage is not directly supported with this model. A conservative position should be held and no monetary benefits will follow

Issues/Risks:

- There will be a risk of fragmented delivery and uptake
- Limited demand stimulation, 'build it and they will come' approach.
- Social loss – innovation in public services will not be certain
- Economic loss –limited employment opportunities and limited development of new high value jobs

Option 3 : Centrally organised Open Data

Description and Rationale:

The formation of a small central team dedicated to developing the data sets within CCRCD with a programme and remit to make them available in a common structure with all City Deal members agreeing to a common delivery team. There would be significant efficiency gains on the basis that a central team is deployed to deliver for all Authorities in the region, rather than each individual authority deploying their own resources to deliver the requirement

Costs:

£ 360k/Annum

Costs are estimated as a team of 6 per annum. High costs are assumed as a high degree of professional and technical skills needed. Resources needed are minimal and considered as normal tools for technical staff

Benefits:

£ 360k

Benefits will be more certain as a common framework and delivery platform will be achieved making it more efficient and effective for the Open Data resources to be utilised across a larger population. The efficiencies gained by not having each LA deploy their own teams will mean at least 10 people, (1 open data FTE per authority), would be saved. The benefits would therefore equate generally to the costs. However, not direct benefits have been considered, making this a very conservative estimate.

Private sector entities would have more confidence in participation

Issues/Risks:

- Gaining agreement of joint funding and selection of the team might be problematic
- Limited demand stimulation, still a 'build it and they will come' approach.
- Social loss – innovation in public services will not be certain

- Economic loss –limited employment opportunities and limited development of new high value jobs

Option 4 : Open Data and Open Market

Description and Rationale:

The formation of a small central team dedicated to developing the data sets within CCRCD with a programme and remit to make them available in a common structure with all City Deal members agreeing to a common delivery team. There would be significant efficiency gains on the basis that a central team is deployed to deliver for all Authorities in the region, rather than each individual authority deploying their own resources to deliver the requirement.

In this option, the Open Data sets will be actively marketed to potential users and bespoke data sets will be developed on request

Costs:

£ 500k/Annum

Costs are estimated as a team of 8 per annum. High costs are assumed as a high degree of professional and technical skills needed. Resources needed are minimal and considered as normal tools for technical staff

Benefits:

£ 500k

Benefits will be more certain as a common framework and delivery platform will be achieved making it more efficient and effective for the Open Data resources to be utilised across a larger population. The efficiencies gained by not having each LA deploy their own teams will mean at least 10 people, (1 open data FTE per authority), would be saved. The benefits would therefore equate generally to the costs. However, not direct benefits have been considered, making this a very conservative estimate.

Private sector entities would have more confidence in participation and a licensing regime would be put in place to encourage usage and later recover some costs for its provision. The target would be to achieve a ‘Break-Even’ position and to initially offer free or very reduced costs access until commercial users had established a market and revenue streams

Issues/Risks:

- Gaining agreement of joint funding and selection of the team might be problematic
- Strong demand stimulation and adapting to what the market needs, but still weighted towards a ‘build it and they will come’ approach
- Balance of licensing needs to be carefully considered to ensure it is stimulating uptake and not restricting access or usage

Option 5 : Implemented PoC

Description and Rationale:

In effect this is an extension of Option 4 and will take the Open Data created to produce a number of PoC. This can be achieved through inviting the private sector to propose costed business plans that utilise the date resources through a challenge fund of some kind, or it can be within the public sector in demonstrating service innovation. A larger team and wider skill set will be required

Costs:

£ 900k/Annum

Costs are estimated as a team of 15 per annum. High costs are assumed as a high degree of professional and technical skills needed. Resources needed are minimal and considered as normal tools for technical staff. Some costs may be offset by combining with SMEs who will fund some of the effort directly themselves, or offer a return of the costs through a later revenue share

Benefits:

£ 1,000k

Benefits will be more certain as a common framework and delivery platform will be achieved making it more efficient and effective for the Open Data resources to be utilised across a larger population. The efficiencies gained by not having each LA deploy their own teams will mean at least 10 people, (1 open data FTE per authority), would be saved. The benefits would therefore equate generally to the costs.

Private sector entities would participate, possibly through a deferred licensing arrangement to later recover some costs for its provision. The target would be to achieve a 'Better -Than-Break-Even' position with some shared risks in the development of the data usage.

The PoCs delivered would act as a beacon for other Open Data projects to follow, creating a fully sustainable development platform

Issues/Risks:

- Gaining agreement of joint funding and selection of the team might be problematic
- Strong demand stimulation through funding some aspects of the services developed within the private sector
- Balance of licensing needs to be carefully considered to ensure it is stimulating uptake and not restricting access or usage

Option 6 : DataCo

Description and Rationale:

This is an extension of Option 5, creating a private sector entity to develop and co-invest in costed business plans that utilise the date resources developed. A smaller team and wider skill set will be required
Costs: £ 500k/Annum Costs are estimated as a team of 8 per annum, plus a private sector funded team of equivalent size. High costs are assumed as a high degree of professional and technical skills needed. Resources needed are minimal and considered as normal tools for technical staff. Some costs may be offset by combining with SMEs who will fund some of the effort directly themselves, or offer a return of the costs through a later revenue share
Benefits: £ 1,000k Benefits will be more certain as a common framework and delivery platform will be achieved making it more efficient and effective for the Open Data resources to be utilised across a larger population. The efficiencies gained by not having each LA deploy their own teams will mean at least 10 people, (1 open data FTE per authority), would be saved. The benefits would therefore equate generally to the costs. The DataCo would lead all development activity with a clear goal of commercialisation, possibly through a deferred licensing arrangement. The target would be to achieve a 'Better -Than-Break-Even' position with shared risks in the development of the data usage. The PoCs delivered would act as a beacon for other Open Data projects to follow, creating a fully sustainable development platform. It would also be hoped that the DataCo would identify gaps in data resources and partner or develop additional resources, particularly around IoT data being gathered.
Issues/Risks: • Gaining agreement of joint funding and selection of the team might be problematic • Strong demand stimulation through funding some aspects of the services developed within the private sector • Balancing the commercial imperatives of the DataCo and the opportunity for innovation in the public sector that does not immediately have a return on the investment could add complexity – but would drive discipline and ultimate delivery of PoCs

3.4 Economic Appraisal

3.4.1 Long list to short list criteria assessment

In order to derive a preferred short list of options, each of the long list options has been assessed against the critical success factors for the programme, namely;

- Does any of the options deliver the strategic objectives of CCRCD?
- Do any of the options deliver sufficient economic benefits, bearing in mind that the intention is to invest to deliver a positive economic benefit to the region
- Is the option achievable in a timely manner?
- Are their any supply side constraints on the project?
- Is the option compatibility and complementary with other programmes

The table presents a preliminary assessment for each long list option against each of the success factors and colour codes accordingly with green strongly achieving the criteria through to red where there is limited benefit.

Full Fibre	Aligned to Strategy	Economic Impact	Achievability	Affordability	Attractive to Supply Chain	Compatibility to other Programmes	Risk	Rank
1. Do Nothing:	Good	Poor	Poor	Good	Poor	Good	Poor	4th
2. Do Minimum: *Supply Side Engagement*	Good	Medium	Good	Good	Good	Good	Good	1st
3. CCRCD *Asset Investment* Programme	Good	Good	Good	Good	Medium	Good	Medium	2nd
4: *CCRCD procurement*	Good	Good	Good	Good	Medium	Good	Medium	2nd

5G and IoT Support	Aligned to Strategy	Economic Impact	Achievability	Affordability	Attractive to Supply Chain	Compatibility to other Programmes	Risk	Rank
1. Do Nothing:	Poor	Poor	Poor	Poor	Poor	Good	Poor	5th
2. Do Minimum: *Supply side market engagement*	Good	Poor	Medium	Good	Medium	Good	Good	3rd
3. *Undertake Future Telecom Infrastructure Review guidance in full*	Good	Medium	Good	Good	Good	Medium	Good	1st
4. *Funded Intervention to extend 4G coverage*	Good	Medium	Medium	Poor	Medium	Medium	Medium	4th
5. *5G and IoT Support*	Good	Medium	Medium	Good	Good	Good	Medium	2nd

Rural Broadband Provision	Aligned to Strategy	Economic Impact	Achievability	Affordability	Attractive to Supply Chain	Compatibility to other Programmes	Risk	Rank
1. Do nothing:	Poor	Poor	Poor	Good	Poor	Good	Poor	5th
2: Do Minimum: *Supply Side Engagement*	Good	Medium	Good	Good	Medium	Good	Good	2nd
3: *Demand stimulation programme*	Good	Good	Medium	Good	Medium	Good	Good	2nd
4: CCRCD *undertaked strategic investments in service providers* & operators	Good	Good	Good	Good	Good	Good	Medium	1st
5: *Community Programmes*	Good	Poor	Poor	Medium	Poor	Medium	Poor	4th

Open Data	Aligned to Strategy	Economic Impact	Achievability	Affordability	Attractive to Supply Chain	Compatibility to other Programmes	Risk	Rank
1. Do nothing:	Poor	Poor	Poor	Good	Poor	Medium	Poor	6th
2: Do Minimum: *Making data sets avilable*	Good	Medium	Medium	Good	Poor	Medium	Good	4th
3: Centrally organised Open-Data	Good	Good	Medium	Good	Medium	Good	Good	2nd
4: Open Data and Open Market intervention	Good	Good	Good	Good	Good	Good	Medium	1st
5: Implemented PoC	Good	Good	Medium	Medium	Good	Medium	Medium	3rd
5: DataCo	Medium	Good	Medium	Medium	Good	Medium	Poor	5th

Table 26 - Success Factor Map

It should be noted that some of these options may be highly achievable from a financial viewpoint (e.g. a small grant to a community fund) but still face external risks and challenges beyond the control of CCRCD.

The key external risks that impact the proposed CCRCD Digital Infrastructure are:

- **State Aid:** It will be time consuming and costly for CCRCD to undertake its own state aid application – typically 2 years and several man years of resources. In addition, the process remains uncertain given Brexit. If CCRCD wishes to minimise risk in this field it should:
  - Prioritise demand side measures (e.g. vouchers, demand stimulation) which do not attract state aid issues
  - Undertake rural in-fill procurements working in conjunction with national or regional programmes that have or are obtaining state aid clearance (e.g. Welsh Govt or DCMS Rural Gigabit Connectivity). This also applies to Community led schemes. However, CCRCD should retain local control and direction of any intervention
- **Supplier appetite:** Industry is constrained in its capacity and the CCRCD is competing with similar measures across the country. The key risks are:
  - Community schemes may attract smaller specialist operators, but there is a risk they do not attract sufficient industry appetite
  - Economic development full fibre projects may be viewed as less attractive outside central urban areas such as Cardiff. In this case a blend of Full fibre procurement and public asset investment may be more appropriate.
- **UK and Welsh Government Programmes:** Such programmes will part fund and address the challenges the region faces. There is a risk that the funding and programmes do not materialise in a timely manner, or that CCRCD funding is used in-lieu of funding when other sources are available.
- **Ability to recruit and attract resources** to lead the digital programme and undertake all procurement, stimulation and co-ordination activities. Failure to have such resources would lead to a failure to deliver economic benefits
- **Stakeholder co-ordination** between authorities and other key stakeholders such as Welsh Govt and PSBA could result in delay and increased costs
- Under any heading, Do-nothing will be in breach of UK and Welsh policy objectives and commitments at the local authority level, but not CCRCD level

3.4.2 The Preferred Option(s)

Given the above analysis a recommended strategy could consist of the following blend of activities

Strategic Objective	Original Outline Business Case Theme	Recommended approach
Full Fibre Provision	Regional Connectivity	• Opens 3 and 4: Fully or partially fund duct and fully open access fibre infrastructure in selected areas • Option 2 : Supply side engagement
	Global Connectivity	• Support Welsh Govt Initiative in funding applications and design
	Welsh Connectivity	• Sort term programme to reposition and promote IX
Stimulate innovation through the delivery of enhanced wireless infrastructure.	5G	• Option 5: Targeted investments in specific projects and use cases • Option 2: Supply side engagement • Option 3: Implement Telecoms Infrastructure Review
	Sensing CCRCD	• Option 5: Establish innovation framework and targeted investments
	Wi-Fi	• Do nothing
Facilitate equality of access – Rural Broadband Provision	Community Fibre	• Option 4: Strategic supply side investments from Challenge Funds • No direct investment in projects • Support UK and Welsh Govt initiatives
Open Data	Open Data	• Option 4: Open Data and Open Market

		• Through a form of Challenge funding, develop both private and public sector PoC (under Option 5) • Ensure all actions allow the evolution into a DataCo at the earliest opportunity to stimulate demand, skill, jobs and outcomes (Option 6)

4 Commercial Case

4.1 Background

This section presents the commercial case for the short-listed options. It should be noted that there are a range of commercial choices to be made under each of the proposed workstreams and external factors that shape the commercial choices to be made. The following sections discuss in turn:

- Potential procurement routes
- Service requirements
- Risk transfer
- Commercial and contractual considerations.

4.2 Procurement Strategy

4.2.1 Background

A sub-set of the recommended shortlisted options will require the conduct of a procurement of assets and/or services. These are the full fibre asset upgrade and infrastructure procurement.

All will need to be undertaken in accordance with public sector procurement regulations and be fully compliant with relevant state aid regulations.

The chosen procurement strategies will take into account existing contractual arrangements and the role of the Welsh Government and the Public Sector Broadband Aggregation (PSBA). It is used by all authorities in the region from which they source connectivity services and service wrap (note there are a small number of sites not sourced from PSBA). It is desirable that any new infrastructure or services procured is either via the PSBA or through a third-party infrastructure provider over which the PSBA is able to provide existing services to the local authorities.

4.2.2 Full Fibre

Infrastructure asset investment

Under this scenario, CCRCD fund the expansion and upgrade of public sector ducting within the region. The following points should be noted:

- Any ducting built or upgraded with public sector funding must be used by the authorities for their own use and the delivery of public sector services – it cannot be built purely for commercial objectives
- Any spare duct capacity can subsequently be offered to the commercial market to lower its costs of deploying fibre infrastructure in the region. However, this must be at benchmarked market prices and open access. Any investment in ducting what is subsequently offered to the market is subject to state aid and CCRCD will need to ensure compliance. The approach is to demonstrate ‘no aid’ through a Market Economy Operating Principle (MEOP). The MEOP provides a mechanism to demonstrate whether there is a market distorting

effect from a public sector organisation delivering goods or services. If there is not a distorting effect, there is no state aid. CCRCD must be able to demonstrate through the MEOP principle that there is no aid and that the project is a genuinely commercial investment, including clearly demonstrating risks and profits and market-based pricing. In practice this requires CCRCD commissioning a state aid lawyer or auditing company to prepare a report on the investment undertaken and express formal advice that there is no aid.

- With the exception of central Cardiff, authorities have indicated there is limited ducting in the region that is suitable for fibre deployment.

Any duct infrastructure built must be for public sector use, linking property or street assets.

In terms of procurement planning CCRCD will need to segment the initial design and build of duct infrastructure from any subsequent operation.

Initial design and build of ducting are typically undertaken by the preferred highways contractor of each of the respective authorities. This can be procured using existing frameworks and contracts but under an agreed, common, commercial grade duct specification

The planning and permissions required from local authorities to build the duct network should wherever possible be put in place prior to the tender process to give certainty to the bidders and allow a fast start to the work.

Upon building the duct, there will be a requirement to facilitate the opening of the ducts to commercial operators. There are effectively three commercial models to do this:

- A concession (e.g. Welsh Govt Trunk Road Network)
- A Co-Op (e.g. Tameside Council)
- An open model (e.g. Aberdeen City Council)

A fuller description and the merits of each approach are described in the enclosed link (https://www.gov.uk/guidance/commercial-models)

From a procurement perspective an open model is the simplest to undertake. In contrast a concession will require a full OJEU procurement process, usually under the Open or CPN procedures. A Co-Operative involves the transfer of duct assets into a co-operative venture which can be time consuming in terms of establishing the entity, its governance. establishment of operational contracts and asset transfer.

Procurement of infrastructure and/or managed service

Under this Option CCRCD authorities procure either:

- Infrastructure; Notably the build and use of dark fibre (or an equivalent wavelength service) to a defined portfolio of public sector sites
- A Managed Service; Gigabit capable connectivity to sites.

This procurement will represent a service driven approach; whereby specific locations[22] are to be provided with a service rather than a specified physical network connection. The manner in which the service is provided will have some limitations placed upon it, but in general it is left to the supplier to provide the service through their selection of the most appropriate network connectivity.

a) Infrastructure procurement

If CCRCD wishes to procure digital infrastructure it is typical to undertake an OJEU procurement (although some authorities have attempted to use existing frameworks' such as SWAN, YHPSN etc but these are typically limited in terms of their flexibility and suitability for an infrastructure procurement). A list of mandatory (and potential optional sites) are defined along with a proposed budgetary ceiling.

The cost, timescales and complexity of such a procurement process means that it would be beneficial to undertake this on a pan CCRCD level led either by the City Deal or an agreed lead authority.

It is recommended that there is the establishment of a CCRCD framework contract from which the authorities (and potentially other public sector bodies in the region) can call off as and when required. This maintains a higher degree of control at the authority level but is a two-stage procurement process.

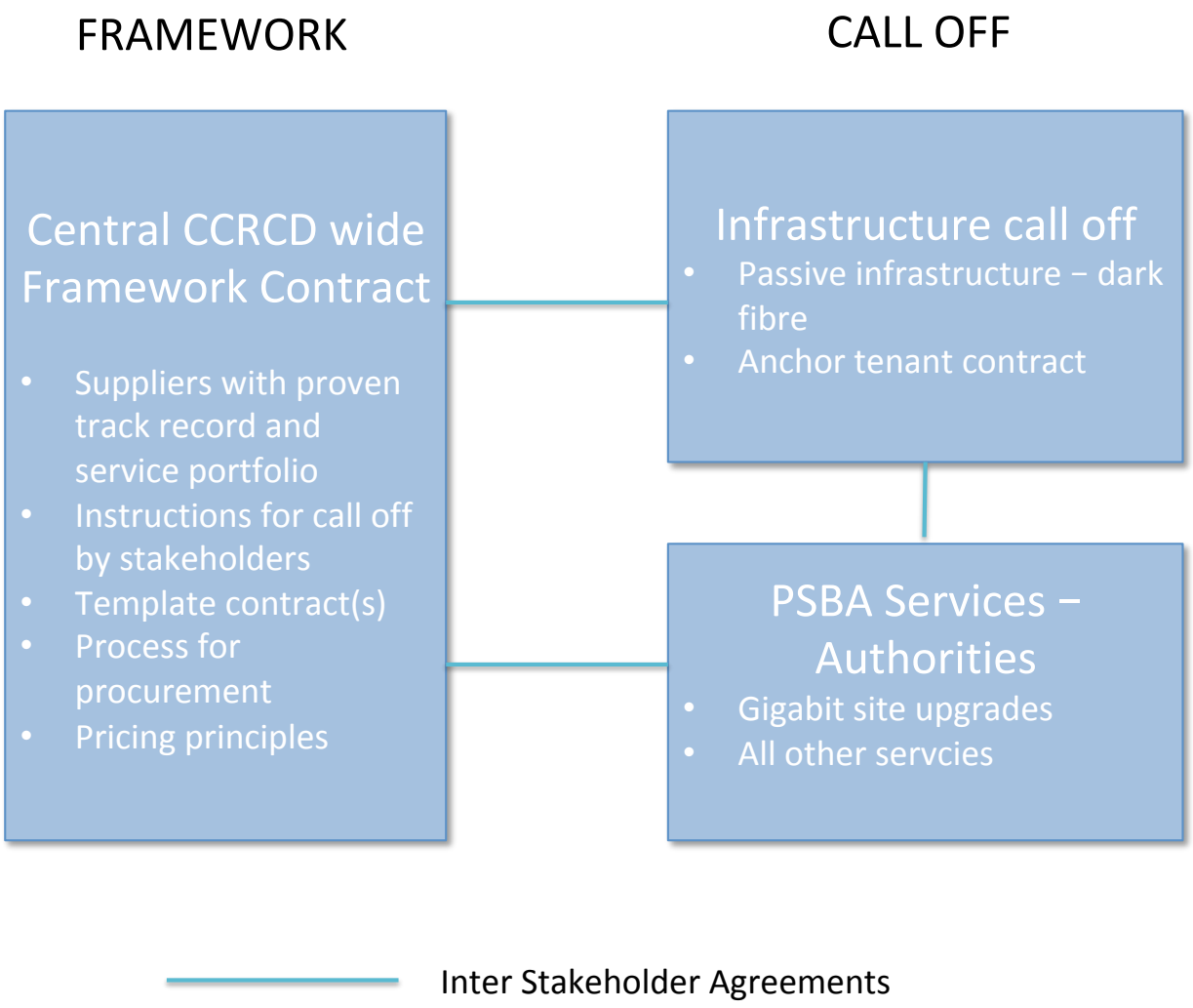
Under the framework approach, a central framework will be procured by CCRCD on behalf the participating stakeholders. Points to note about this central framework are as follows:

- Suppliers will be placed on the framework following a competitive process – possibly using an Open Procedure
- Suppliers must have demonstrated a track record and capability to deliver at least one of the following services; dark fibre, Gigabit capable connectivity, additional services.
- The framework will include a template contract
- It will include instructions on how to call off
- Although pricing will be bespoke for each call off based on local requirements, the framework will specify high level pricing principles to ensure value for money. This will include benchmarking.
- Each authority of groups of authorities will then define a call off contract based on their individual service needs, coverage and budgets.
- Each authority sources a service wrap from PSBA who delivers services over the new infrastructure

[22] Locations are public sector locations which represent an anchor customer for services

- There will be inter-stakeholder legal and financial agreements between all respective purchasing bodies as appropriate across this structure.

Figure 5 - Procurement Framework



Asset ownership

A key commercial question is the ownership of this duct and fibre asset and whether it is in the public sector or commercial sector. This will need to be specified in the procurement as it will shape the commercial model and evaluation criteria. For example the City of Cardiff has received propositions from industry to enter into commercial relationships.

The table below summarises the merits of each approach;

Benefits	Ownership of ducts/fibre	Challenges
Public sector	Public sector owns an asset in return for its investment Scope to use to deliver other public sector services Potential for a revenue stream to recoup initial investment	Public sector unable to expand reach to commercial and residential market unless assets moved to commercially viable SPV Public sector responsible for operations, SLAs, sales etc Access to capital for future expansion Transfer of public assets into a new vehicle such as a co-op or SPV? Supplier appetite toward use of state-owned infrastructure may be limited
Commercial sector	Commercial sector owns assets but gives public sector an IRU in return for capital investment Likely to lower authority's revenue spend on connectivity No state aid constraints on expansion of network to commercial and residential areas	Public sector does not control coverage and reach Risk commercial parties will concentrate on limited number of high value commercial areas.

Table 27 - Ownership Models

Effectively there is a risk reward trade-off for CCRCD authorities, a commercially led approach reduces state aid and operational risk but does not deliver a revenue stream or asset to the public sector. Much depends on the motivation for the procurement. If

driven by a desire for inward investment and connectivity to businesses and resident's commercial ownership tends to be favoured. If driven by a desire for the public sector to have an asset and a revenue stream, public sector ownership is favoured..

However, there is not a consensus across the country on this matter. Both approaches deliver connectivity to the public sector estate and much depends on political priorities. Cities that have sought to maximise commercial inward investment into their region to serve businesses and residents have tended to favour an IRU on a commercial asset. These include Peterborough, Aberdeen, Newport and York. In contrast other have favoured public ownership for political and social reasons and to generate an income stream. These include Bristol, Mid Sussex and Liverpool.

It should also be noted that some bidders may also be willing to take on risk, building some of the network and providing services at their own cost. Risk appetite will be reflected in the overall cost.

As part of the economic case the estimated build cost of Options3/4 across the key connected cities of the region was £20m. It is likely that this cost would not be fully carried by the public sector as the winning tenderer would be able to use the infrastructure for commercial use. A key element of the procurement process could be to score the level of contribution offered by the commercial sector in the selection of the winner. A further variation should be allowed. Bidders can explicitly show their risk appetite by committing to building and offering services across a wider footprint than that specified in the tender. A wider build-out at their cost would represent an inward investment. The weighting for this would need to be determined during the tender process.

The sources of capital funds from the public sector is typically derived from a blend of three sources;

- CCRCD funds
- Other DCMS funding streams (e.g. LFFN)
- A local contribution by the authority.

In the latter case, authorities have looked at their on-going expenditure on connectivity services over a period of say 15-20 years. A percentage of this has then been capitalised to fund the building of a dark fibre network over which they will have a right to use. By using the IRU on a dedicated dark fibre savings can be made on an on-going basis as there will be a reduced requirement to procure circuits. As an illustrative example the Cardiff region analysed its PSBA costs across a time period. These costs are actually a blend of circuit cost with BT and a service wrap and management fee. PSBA provided this breakdown. It assumes that there is still a need to pay for the service wrap and management fee along with one-off costs for equipment upgrades and interest charges. However, there was a saving in circuit expenditure by migrating to an IRU approach and hence spend was migrated from the revenue account to the capital account to fund the initial build. This approach has also been used around the country by bodies such as Greater Manchester Combined Authority.

Managed Service Procurement

Under this approach CCRCD authorities procure a gigabit cable managed service. This in turn will drive investment in fibre within the chosen footprint.

Under this approach services would be procured directly from PSBA without the need for a further procurement.

4.2.3 **Equality of Access – Rural Broadband**

It is NOT proposed that CCRCD undertakes a rural infill procurement as this would replicate other UK and Welsh Govt initiatives.

The procurement is the provision of connectivity to residential and commercial premises with no, or poor, internet access. All of the exact locations to be reached are to be specified within each procurement action, as well as the level of service[23] to be provided.

Should CCRCD wish at any point to directly fund rural broadband procurement the optimum procurement path is through the use of other existing procurement facilities, but against s CCRCD provided scope. Several options may be available, including working through Welsh Government procurement channels and UK USO programme[24].

Possible state aid compliant procurement routes open to CCRCD are:

- PSBA; This can be the used for connection of the public sector estate in rural areas and PSBA is already in discussions with some of the local authorities in the region on this matter. (Note; If CCRCD is successful in obtaining funding from the DCMS Wave 4 Rural Gigabit Connectivity Programme which seeks to drive fibre into public sector hubs in rural locations the PSBA can be used for delivery under this programme)
- Welsh Government Dynamic Purchasing System; The Welsh Govt is considering establishing a Dynamic Purchasing System whereby the region can call off its requirements from an approved list of suppliers under the shelter of a national state aid clearance. At the time of writing this scheme is yet to be finalised but CCRCD should liaise with Welsh Govt on this matter to ensure its technical and commercial requirements are addressed in the design of the scheme
- DCMS USO channels; It is recommended that discussions are begun immediately with the DCMS to ascertain the best way for interaction. If at all possible, CCRCD authorities could influence control of the funding and delivery of the USO in the region, and top-up individual connections where they exceed the £3,400 cap. This will introduce a local knowledge capability that a national scheme could not hope to fulfil. It would also allow more effective aggregation of the fee for each connection, sharing some of the costs to provide main fibre

[23] Service should be defined as a minimum Mbs

[24] Announced but yet to be put in place.

bearers into an area. This approach would also open the market for provision to smaller Alt-Net providers who may well agree to recruit from the local population for construction and on-going service support

Such smaller alt-net carriers may well be candidates for investment by CCRCD under its Challenge Fund

4.2.4 **Next Generation Wireless**

Undertake Future Telecom Infrastructure Review guidance in full

There is no direct procurement action necessary.

The action will require the set-up and recruitment of a dedicated specialist team to provide, on behalf of the four local authorities, a service in line with that proposed in the Future Telecoms Infrastructure Review, (FTIR). A team of five is thought sufficient, provided each authority provides a single point of contact through which to deliver the streamlined services as proposed in the FTIR.

Due to the specialised nature of the staff, it is recommended that an external agency is used to identify candidates and to negotiate their recruitment.

Funded intervention to deliver 5G and IoT connectivity in selected locations

Procurement will be undertaken in respect of a project by project requirement, covering one, or a combination of three actions;

- 4G-Adv coverage and services
- 5G coverage and services
- IoT coverage and services

The only source for providing such coverage and services are the existing mobile operators and a few specialist IoT providers. Procurement will therefore be to seek one or more operators to deploy the necessary network services. The initial work will be to issue an RFI seeking to gauge market interest and to establish direct contact with each mobile service provider bidding teams. It is likely that there will be a need for one-to-one briefings of the mobile companies to discuss the procurement, contract framework and service provision. It is not recommended to have a single supplier briefing as there are different commercial options that bidders may choose to offer.

An important note is that any network coverage and services deployed through CCRCD intervention would be open to the public and businesses to use, they would not be limited to the specifics of any one project. In this way, the benefits associated with the services being made available will be spread across a wide range of uses.

The specification that will be provided to the operators is simply the geographic coverage required and the type of service needed. Operators may respond in several ways;

1. Where the coverage request intersects with the operator's own coverage plans and meets their own investment criteria, then a timetable can be agreed, with adjustments made to this depending on willingness to cooperate. In effect this would be an acceleration of commercial deployment by one or more mobile service provider and would represent a zero cost to CCRCD.
2. Where the coverage request is not in the mobile service providers current one-year planning horizon, then an accelerated timetable can be agreed, with adjustments made to this depending on willingness to cooperate. This is again an acceleration of deployment but may involve some level of commitment to purchase service in the coverage area. Again, this would represent a zero cost to CCRCD, but the project being supported will need to give a commitment to purchase services at a defined level and over a period of time. This might be particularly suited to IoT networks.
3. Where the coverage request is not in the CSPs current one -ear planning horizon and there is no commercial justifiable cause to accelerate deployment, then proposals can be invited from the operators to identify their individual *risk increment* in providing the coverage requested.
    a. The *risk increment* is the amount of co-investment they would need to have from CCRCD in order to cover their losses over the initial three-year operational period, after which time the risk increment is ended and no further support is offered. This is in effect, assisting the CSP to establish a customer base within a fixed window, continuation of the service beyond this window is at risk, but it is highly unlikely than a CSP would cease services as the cost of removing the equipment would be prohibitive as would the public response.
    b. Different CSPs will have a different view of the risk increment, depending on their five-year horizon for coverage in the identified geographic area. The lowest *risk increment* would then be agreed with one or more CSPs that can achieve immediate deployment and service offering
    c. The project benefiting from the coverage would then be able to proceed and the CCRCD team promote further use of the network coverage being provided for new use cases and further innovation
    d. Chosen CSPs would also be expected to promote the service and maximise usage and thereby revenue. Should the revenue being gained by the operator in the coverage area reach an agreed level during the three-year period when the *risk increment* is being paid, then the payment will stop immediately
    e. A mechanism will also be included by which the *risk increment* paid can be recovered on a quarterly basis should the coverage deployed exceed a level of agreed usage, (revenue), this would be reflecting a now profitable deployment, (i.e. the risk perceived in deployment did not materialise or ended sooner than anticipated through stronger user uptake).

The procurement is therefore a process undertaken on a project by project basis, with different CCRCD cost and payment arrangements depending on the risk the

deployment represents. The procurement would also be treated as an investment with the potential for successful deployments returning the investment made by CCRCD.

A single set of template requirements documents and contractual framework should be developed and used for all deployments.

The procurement itself should be in the form of a framework agreement for the supply of network coverage. Within the framework, there will be provision to run mini-competitions against each project's needs. The basis of the framework award will be on capability and willingness to accept the structure of a risk increment approach and in providing a return on the CCRCD investments, made against set pre-determined success criteria. The risk increment value will be allowed to vary between 0% and 80%[25] of the total deployment and service provision cost.

4.2.5 Open Data

Procurement in terms of Open Data is not related to capital investment, the primary effort is in identifying and recruiting a team of specialists in data and analytics. There may be some additional costs for hosting databases and tools for the development of applications and tools, but these are now normal office-based computing access.

As such, there is no procurement exercises anticipated.

4.3 Summary and Key Commercial Considerations

4.3.1 Key commercial questions

With the chosen short-listed options, there are a number of options in terms of procurement, delivery model and ownership.

Each of these decisions are dependent on both internal factors such as budgets, resources, existing contracts and political preferences and external dependencies such as national and regional programmes and state aid.

Stream	Key Dependencies
Equality of Access	
How should an CCRCD connectivity focused investment be defined and undertaken? • What is the desired company profile? • Term? • Anticipated returns?	Target market segments and alignment to CCRCD objectives Technical, commercial and legal due diligence State aid compliance

[25] 80% is given as an upper bound to ensure some risk is taken by the CSP and some investment is made. The selection of projects will affect the risk increment applied.

• Debt or equity? • Scale of funding	Competition Shills and resources Track record
Full Fibre	
What is the desire to invest in public sector assets (e.g. ducting)?	Willingness of CCRCD authorities to use new ducting Appetite of commercial bodies to use public sector owned ducting State aid challenges
What is the scope of the procurement for commercial full fibre services in the region? • Infrastructure or managed service? • Geographic coverage? • CCRCD framework or one-off procurement?	Available budget Integration with PSBA Integration with WAN and other contracts Supplier appetite to invest in region State aid
What is the level of commercial risk/reward that CCRCD wishes to take?	Is the key motivation for the procurement to; • Enhance public sector connectivity? • Deliver additionality i.e. connectivity to businesses and residents in the region • Generate revenue and value?
Next Generation Wireless	
Selection of projects to be supported with coverage Service types to be deployed Level of risk increment that is acceptable to CCRCD	CCRCD core projects and target sectors underpinned Appetite of CSPs Funding structure to be applied
Open Data	
Identifying lead Local Authority and team members	Agreement across LAs to a central team to deliver Open Data

Priorities in the provision of Open Data Path to commercialisation	Achieving a common schema across LAs for data sets Form of licensing to stimulate usage and uptake of services without sacrificing later economic exploitation to at least meet the costs of data provision and curation

Table 28 - Commercial Issues

5 Financial Case

5.1 Introduction

This section presents the financial case for the streams of work defined in this outline case. Key assumptions are;

- All capital-intensive procurements take place in the financial year 2020/21 and 2021/22
- All capital programmes are spent over a four-year period between 2020/21 and 2024/25
- Capital programmes are funded by the CCRCD Infrastructure Fund – supplemented in some cases by central Govt funding, notably DCMS LFFN.
- A Challenge Fund is used for strategic investments in industry and possible Joint Ventures.

In additional the following points should be noted:

- **Income Streams:** An income stream in not envisaged under the Infrastructure investment programme. Expenditure is incurred for the purposes of procuring infrastructure for the public sector own use or GAP funding telecommunications infrastructure investment into areas that are not commercially viable. Income would however be generated under strategic investments made under the Challenge Fund.

5.2 Infrastructure Fund - Capital Expenditure

This section presents the capital expenditure profile for each of the themes. The following points should be noted;

- In each table the anticipated contribution from CCRCD, commercial sector and central government has been estimated
- In a number of cases it is anticipated that the programme will encourage additional further on-going commercial investment. This has been estimated wherever possible
- No commercial or central funding sources are guaranteed at the time of writing and will be dependent on the outcome of procurements and the region successfully applying for central government grant funding.

5.2.1 **Urban/ Economic Development Areas**

The chosen option include a requirement for new duct and fibre infrastructure to be built in the key cities and development zones of the region. A detailed bottom up cost modelling exercise was undertaken and the projected capital costs of the build programme was £20m. This assumes:

- Infrastructure is built in each of the priority areas identified in the economic case, notably the M4 development corridor across Monmouthshire, Caerphilly,

RCT and Bridgend, Vale of Glamorgan and the key development zones in Gwent

- There is a build of new duct infrastructure across the region to facilitate this fibre deployment. It is possible that costs might be lowered through wholesale access to commercial owned ducting (notably from BT). However, this will not be known until the procurement process is completed. Some telecommunications providers do not use third party ducting as they prefer to own their own infrastructure for reasons of financial, operational and management control. In addition, there may be a desire on behalf of the public sector to build and own its own ducting over some routes.

There is a greater commercial appetite for investment in key urban economic development areas and significant commercial investment has been leveraged elsewhere in the country. This is typically in two stages; an initial contribution to the building of a network to public sector sites followed by further waves of investment as the commercial sector connects residential and business premises.

Once again, such activity has to be initially stimulated by public sector intervention though the state aid compliant approach of connecting public sector premises. A number of other Cities have adopted this approach and these are attracting inward investment from industry. For example, Vodafone has announced a plan to build FTTP connectivity to 5m homes by 2025. So far, the cities that have been chosen are those where it has access to a dark fibre network infrastructure of the type envisaged in this programme. They include Peterborough, Milton Keynes, Aberdeen, Stirling, Coventry, Edinburgh and Huddersfield. In all of the above cases the Councils have driven inward investment through the use of public sector purchasing power to anchor investment.

Figure below presents the estimated capital expenditure profile for this programme of work. It assumes that;

- A procurement is conducted throughout 2019/20 with contract award by end of the year
- A three-year build programme commencing in 2021
- Capital costs are paid upon delivery of key build milestones (e.g. routes completed, or sites connected)
- The commercial sector contributes 30% of initial build costs for connectivity to public sector sites as it will subsequently be in a position to commercialise this infrastructure.

Project Capital Expenditure						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
CCRCD/Local authorities	-	4.0	3.0	2.0	-	**7.0**
Central Government Grants (LFFN)	3.5	3.5	-	-	-	**7.0**
Private Sector	-	2.0	2.0	2.0	-	**6.0**
Total	**0.0**	**9.5**	**5.0**	**4.0**	**0.0**	**20.0**

Table 29 - Estimated development zone Capital Expenditure Profile and Funding Source

5.2.2 Next Generation Wireless (5G/IoT)

Table 31 presents the capital expenditure profile for the transport corridor theme. This is driven by the accelerated deployment by operators of 5G and IoT services over the first 5 years. This investment will be primarily commercial led under encouragement and initiative from CCRCD.

The tables show a front ended expenditure, this is considered reasonable and indeed necessary as all of the digital infrastructure is enabling later benefits. The sooner the infrastructure is in place the sooner benefits can be realised. It is also stand-alone in that much of the expenditure is time limited only by the availability of resources within the digital infrastructure team.

Project Capital Expenditure						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
CCRCD	-	3.0	2.0	2.0	-	7.0
Central Government Grants	-	-	-	-	-	0.0
Private Sector	-	3.0	2.0	2.0	-	7.0
Total	**0.0**	**6.0**	**4.0**	**4.0**	**0.0**	**14.0**

Table 30 - Estimated Next Generation Wireless Capital Expenditure Profile and Funding Sources

5.2.3 Infrastructure Fund - Capital Expenditure Summary

Estimated Capital Expenditure						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
Development Zones Fibre	0.0	9.5	5.0	4.0	0.0	20.0
Next Generation Wireless	0.0	6.0	4.0	4.0	0.0	**14.5**
Total	**0.0**	**15.5**	**9.0**	**8.5**	**0.0**	**34.5**

Table 31 - Estimated Digital Programme Capital Costs

5.3 Funding Sources - Revenue Expenditure

5.3.1 Development Zones Fibre

It is assumed that any duct/fibre infrastructure built as part of this programme will be maintained and commercialised by a commercial partner. As a result, revenue costs are relatively light and limited to;

- On-going supplier engagement and potentially some programme management and stakeholder liaison will need to be undertaken. Hence an additional expenditure of £150k per annum has been included
- One off procurement of duct and full fibre infrastructure. It is assumed that this occurs in 2019/20

This is presented in the figure below:

Estimated Revenue Costs						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
Supply side engagement and demand stimulation	0.15	0.15	0.15	0.15	0.15	**0.75**
Procurement support: **internal** **external**	0.1 0.15		-	-	-	**0.25**
Total	**0.4**	**0.15**	**0.15**	**0.15**	**0.15**	**1.0**

Table 32 - Estimated Connected Cities Programme Revenue Costs

5.3.2 Next Generation Wireless

The action will require the set-up and recruitment of a dedicated specialist team to provide, on behalf of the four local authorities, a service in line with that proposed in the Future Telecoms Infrastructure Review, (FTIR).

In addition a team will be required to specify and manage IoT and 5G intervention projects.

Estimated Revenue Costs						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
FTIR		0.25	0.25	0.25	0.25	**1.0**
Specific IoT 5G projects	-	0.25	0.25	0.25	0.25	**1.0**
Total	**-**	**0.5**	**0.5**	**0.5**	**0.5**	**2.0**

Table 33 – Next Generation Wireless Programme Revenue Costs

5.3.3 Open Data

The formation of a small central team dedicated to developing the data sets within CCRCD with a programme and remit to make them available in a common structure with all City Deal members agreeing to a common delivery team. This may be extended in reach and ambition into a commercial venture using the Challenge Funds

Estimated Revenue Costs						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
Open Data		0.5	0.5	0.5	0.5	**2.0**
Total	**-**	**0.5**	**0.5**	**0.5**	**0.5**	**2.0**

Table 34 – Open Data Programme Revenue Costs

5.3.4 Revenue Expenditure Summary

Estimated Revenue Costs						
(£m)	**Year1 (19/20)**	**Year 2 (20/21)**	**Year 3 (21/22)**	**Year 4 (22/23)**	**Year 5 (23/22)**	**Total**
Development Zones Fibre	0.4	0.15	0.15	0.15	0.15	**1.0**
Next Generation Wireless	-	0.5	0.5	0.5	0.5	**2.0**
Open Data	-	0.5	0.5	0.5	0.5	**2.0**
Total	**0.4**	**1.15**	**1.15**	**1.15**	**1.15**	**5.0**

Table 35 - Estimated Digital Programme Revenue Costs

5.4 Challenge Fund

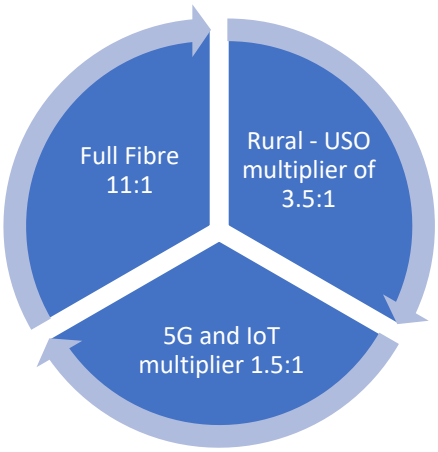
The key opportunities identified for the CCRCD Challenge Fund from this programme of are to provide equity or working capital for ventures in the following areas:

- Equality of Access – Rural Broadband; There are a number of emerging broadband infrastructure providers seeking to address the residential and commercial broadband market in the CCRCD region. These range from innovative wireless providers to those seeking to deploy fibre infrastructure in BT ducting. Many such operators are proactively seeking support from seeking financial support from CCRCD. A Challenge Fund could be allocated for such investments. Given the addressable market a fund of up to **£20m** could be envisaged
- Open Data – Establish commercial venture **£5m**
- Next Generation Wireless Ventures – Establish innovation ventures **£7m.**

Hence a total fund of **£30m** could be envisaged for investment in commercial digital initiatives.

5.5 Economic Benefits

As part of our business case we have undertaken research into the benefit/cost ratios that apply vary for different interventions across different deployments of digital infrastructure, but all are positive in their impact. Considering three main headings and applying a conservative aggregation interpretation of current figures to make them directly appropriate, the following applies;



Economic Benefit Multipliers over 15 years – Economic uplift for every £1 invested

Full Fibre, 11:1 multiplier[26]

Rural, 3.5:1 multiplier[27]

5G and IoT, 1.5:1 multiplier[28]

[26] extrapolation from Regeneris Report – The Economic Impact of Full Fibre Infrastructure in 100 Towns and Cities

[27] UK Govt case for USO intervention

[28] EC report on 5G impacts, TeliaSonera Inst, benefits of 4G Sweden & Estonia

Full fibre has the highest immediate economic and social impact and is therefore a primary concern to establish, evidenced by the UK government statement that the UK must achieve full fibre[29] for 15 million premises by 2033. Having fibre coverage this deep into the fabric of the nation, establishes a perfect base on which to build further reaching rural coverage.

For 5G, fibre connectivity is an absolute pre-requisite for each of the radio base station sites providing the wireless coverage, piggybacking on the fibre infrastructure allows 5G to be rapidly deployed and reduces build costs. Citizens and businesses having access to world class fibre networks and 5G will open the door to innovation at all levels and herald the move towards full digital transformation across both public and private sector organisations.

[29] https://www.gov.uk/government/publications/future-telecoms-infrastructure-review

5.6 Financial Summary

The table below summarises the budget spend and investment sources along with associated benefits.

	£ millions	Estimated Leveraged Private Sector Investment over 5 years	Economic Benefit over 15 years
Infrastructure Fund (5-year programme)			
Development Zones Fibre	£7.0m (plus £7.0m grant from DCMS)	£6.0 million initial investment plus > £70.0m pull through investment (1)	>£220m
Challenge Fund (5-year programme)			
Equality of access; Investment in broadband service providers	£20m	£40m – based on pull through investment and demand stimulation (3)	>£70m
Next Generation Wireless Ventures	£7m	£7m (2)	>20m
Open Data Ventures	£5m	£5m (2)	>15m
Cumulative 5 Year Revenue Costs	£5m		
TOTAL	**£43m**	**>£125m**	**>£325m**

(1) The split of costs in LFFN projects of this nature have shown that that the public sector bears much of the cost of the initial project (typically 60%). This is because the initial project is solely to connect public sector sites due to state aid constraints. However, the commercial sector does acknowledge a contribution to the cost as it is able to commercial the assets. In subsequent pull through investment, the commercial sector bears the full cost as it is based on build out to homes and business premises.

(2) Match funding assumed

(3) It is estimated that approx. £60m is raised to serve up 20,000 premises at £3000 per line (Note currently 8000 premises have limited or no service and we assume a further 12,000 sites connected through demand stimulation activities) . CCRCD contributes up to 33% of this capital requirement through equity investment.

Cardiff Capital Region City Deal

DCMS LFFN Wave 2
SUBMISSION

Table of Contents

1 Introduction

The breadth and quality of digital infrastructure available in Wales has fallen behind that found in many other parts of the UK and the Cardiff Capital Region has significant gaps in service provision and availability. For example;

- There remain a large number of rural sites not able to access superfast (>30Mbops) broadband services. There are over 8000 sites in the region falling beneath the UK Governments stated Universal Service minimum threshold of 10Mbps for broadband services
- The number of business and residential premises with access to full fibre services is <3% in the region. In contrast the City of London has 12.5% availability. Internationally the comparisons are starker with Japan 97%, Sweden 44% and an EU average of 14%.

CCRCD intends to work alongside the UK Government, the Welsh Government and industry to deliver world class, high-quality, full fibre and wireless digital services across the region.

Connectivity is a key aspect of the City Deal that calls for a future-proofed deployment of both fixed fibre and mobile networks that will provide a transformative foundation for both businesses and citizens across the region and beyond.

However, it should be stated that digital connectivity is not an end in itself but a key enabler for the region in its economic investment plan. CCRCD aspires to an intervention, growth and investment prospectus that is underpinned by enhanced digital connectivity.

There are a range of digital connectivity interventions that will support the strategic aims for the region, but these will need to be developed into separate sets of objectives as follows;

i. Ensure cities and development zones have access to open world class full fibre infrastructure. This will:
   - improve the quality of public service delivery by ensuring all public buildings are digitally connected, facilitating improved efficiency and public access to services
   - deliver cost savings to the public sector for digital connectivity
   - stimulate competition and choice in digital services
   - stimulate inward investment in the region by telecommunications industry and hence improve access to services for residents and businesses
   - deliver economic benefits through the usage of digital infrastructure, notably increased efficiency and enhanced productivity
   - directly support and stimulate the digital transformation of services and products

ii. Facilitate equality of access to broadband services across the region, notably in rural areas. This will deliver the following spending objectives;
- improve the quality of public service delivery by ensuring communities in remote areas have access to services
- social cohesion and inclusion across the region to sustain communities
- stimulate economic growth by enhancing opportunities for employment.

iii. Stimulate innovation through the delivery of enhanced wireless infrastructure by:
- specific projects should be identified that will act as a proof of concept against which decision about further investment by the operators, or in cooperation with CCRCD, can be made. In order to open 5G and IoT use cases and projects to the widest audience, a challenge fund is proposed through which innovation can be stimulated.

iv. Creation of a fully Open Data environment by:
- making all of the vast amount of publicly held data (with the exception of certain data, for example sensitive personal data) available to all, without copyright, patents or other methods of control to drive competitiveness and innovation.

This paper present the CCRCD revised application to DCMS LFFN WAVE 2 to facilitate equality of access across the region through the upgrade of existing public sector sites currently served by copper infrastructure.

2 Outline Strategic Case

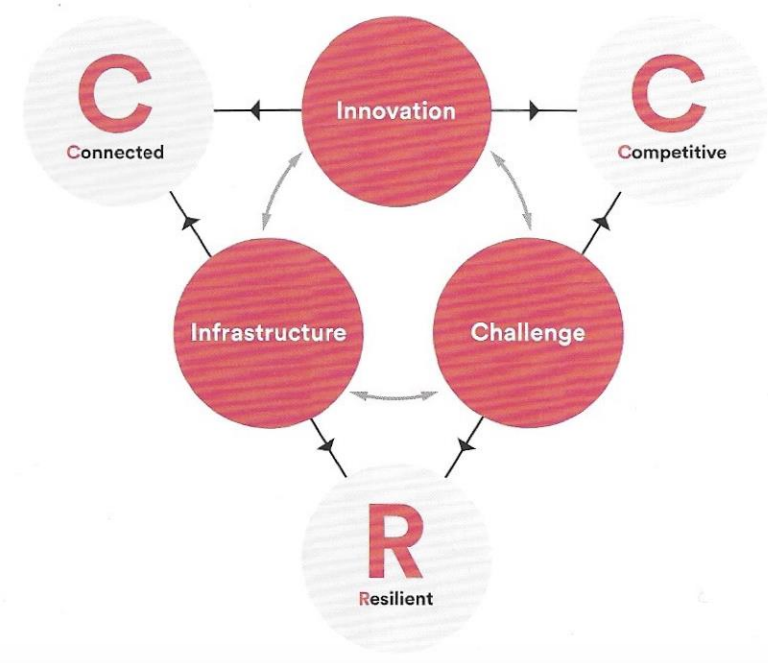
2.1 Strategic Context

2.1.1 **Background**

The CCRCD was established in 2016 based on the key objectives of driving growth, inclusivity and sustainability. It is a region with the main urban centres in Wales, complemented by a wider urban and rural landscape and a significant coastal footprint that has created a diverse economic profile with numerous opportunities and challenges.

The region has a highly skilled and educated workforce. However there remain challenges; notably the need for an upturn in productivity and increased participation rates. The region also has challenges in terms of availability of physical and digital infrastructure.

The planned interventions within the City Deal represent a fifteen-year programme with a commitment of £1.2 billion for the region, focussed around three key dimensions, Innovation, Infrastructure and Challenge. Within this framework a requirement has been identified for enhanced connectivity.



Connectivity is a key aspect of the City Deal that calls for a future-proofed deployment of both fixed fibre and mobile networks that will provide a transformative foundation for both businesses and citizens across the region and beyond.

Improving the connectivity within the region is critical as the region has suffered from a lack of commercial investment in digital infrastructure that consequently has resulted in an underlying gap in delivery capability compared with other regions of the UK.

A continued failure to address the issue directly, will have a severe negative impact on the region and lead to:

- Loss in local productivity, employment and reduction in GVA
- A failure to attract inward investment by highly skilled digital intensive industries

- An adverse impact on the delivery of local services, notably education, health and transport
- Environmental challenges
- A widening gap in access to digital services across the region leading to further isolated communities
- Limiting digital transformation across the public and private sector
- The cities and development zones of the region losing competitive advantage.

2.1.2 **Organisation overview**

The Cardiff Capital Region (CCR) comprises the ten local authorities in South East Wales (Blaenau Gwent; Bridgend; Caerphilly; Cardiff; Merthyr Tydfil; Monmouthshire; Newport; Rhondda Cynon Taf; Torfaen; and Vale of Glamorgan), and the CCR Cabinet is made up of the Leader from each of those authorities. It is the ultimate decision-making body for the CCR City Deal, responsible for overseeing and coordinating the councils' obligations in respect of the City Deal.

The main responsibilities of the CCR Cabinet include:

- Managing the CCRCD Wider Investment Fund (decisions on projects and schemes to be funded are taken by the Regional Cabinet)
- Overseeing the progress of the CCR City Deal and to give strategic direction, delivering the agreed CCR City Deal Strategic Business Plan; The plan specifies the regional strategic objectives of the CCR City Deal and key themes have been identified to focus the approach:
  - Skills and Employment,
  - Innovation,
  - Connecting the Region, and
  - Regeneration and Infrastructure.
- Considering the scope for strengthening Capital Region governance further, subject to the agreement of the ten local authorities.

The programme aims to deliver up to 25,000 new jobs, achieve 5% increase in GVA and leverage an additional £4 billion of private sector investment.

Both the UK and Welsh Government are contributing to the Capital City Region Investment Fund, while the ten local authorities themselves will also contribute over the 20-year duration of the Fund. The largest part of the investment will fund the proposed Metro network for South East Wales.

The Cabinet are responsible and accountable for;

- Managing the CCR Wider Investment Fund (decisions on projects and schemes to be funded are taken by the Regional Cabinet)
- Overseeing the progress of the CCR City Deal and to give strategic direction,
- Delivering the agreed CCR City Deal Strategic Business Plan
- Considering the scope for strengthening Capital Region governance further, subject to the agreement of the ten local authorities

To support the Cabinet, there are a number of advisory bodies;

- CCR Transport Authority
- CCR Skills Partnership
- CCR Economic Growth Partnership
- CCR Business Council

All interventions will be subject to the submission of detailed business cases and approval by the Welsh and UK Governments.

2.2 The Case for Change

2.2.1 Spending and Investment Objectives

Digital connectivity is a key enabler to deliver the economic and social benefits within the City Deal.

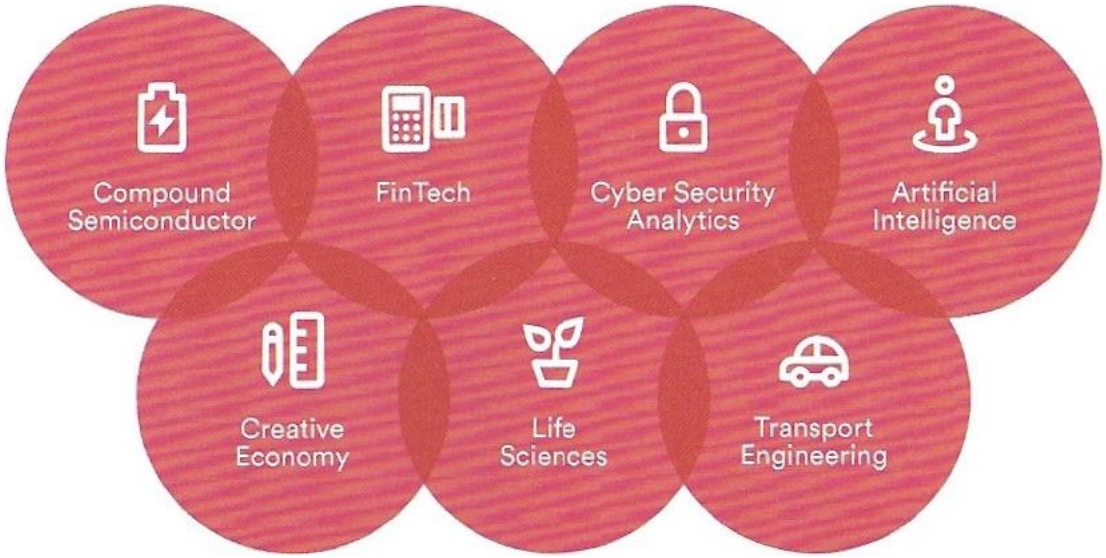
CCRCD will work alongside the UK Government, the Welsh Government and industry to deliver world class, high-quality, full fibre and wireless digital services across the region.

The CCRCD Vision;

"A Prosperous Capital City-Region for Wales" - a decision making centre, a global gateway for capital, trade, and visitors, a knowledge hub and a major population centre and business cluster for Wales"

City Deal's digital strategy will deliver its objectives by supporting intervention in specific areas and for specific projects through a combination of connectivity types, and service delivery depending on what is most suited.

Figure 1 - CCRCD Investment Sectors



It must be remembered that the digital connectivity rests within a dynamic service provision environment, operated by large independent private sector organisations. It also exists within a number of existing digital infrastructure intervention programmes operated by the UK and Welsh governments.

2.2.2 Delivering Full Fibre Under LFFN

Existing Arrangements

The region has a very low penetration of full fibre to the premise. Figure 2 shows the 2018 Ofcom data that reveals the penetration full fibre services in the region.

	% of premises able to receive Full Fibre
Bleanau Gwent	1.00%
Bridgend	4.60%
Caerphilly	0.40%
Cardiff	3.30%
Merthyr Tydfil	2.00%
Monmouthshire	5.20%
Newport	2.20%
Rhonda Cynon Taf	1.80%
Torfaen	2.20%
Vale of Glamorgan	3.10%

Figure 2 - Full Fibre Availability (UK 4.1%)

In contrast the City of London has 12.5% availability of Full Fibre. Internationally the comparisons are starker with Japan 97%, Sweden 44% and an EU average of 14%. Despite the fact that BT has announced a programme of investment in the key commercial centres in Cardiff, it is unlikely this will lead to deeper roll out and availability in the region in the next five years. Similarly, alternative network operators are prioritising other centres in the UK. The Cardiff City Region City Deal must therefore have an objective to address this challenge.

Existing infrastructure is largely provided by the incumbent carriers BT and Virgin Media. There is a small footprint of full fibre in the City of Newport delivered by City Fibre (largely linking the CCTV sites) and Pinacl linking Newport City Council buildings.

The Welsh Government is also potentially a relevant stakeholder;

- The PSBA delivers services to public sector sites across the region and is a key channel to deliver full fibre connectivity
- A Trunk Road concession contract is being awarded to deploy ducts and fibres across the trunk roads from the Severn Bridge to Pembroke. This would create a fibre spine across the region potentially facilitating connectivity to Ireland and beyond. At the time of writing this project is subject to DCMS funding approval.

Scope and Service Requirements

An indicative fibre routing and site upgrade programme was proposed by the region under its initial DCMS Local Full Fibre Network (LFFN) proposals for Wave 2 and Wave 3 applications.

These initial proposals are summarised in the map below in Figure 3.

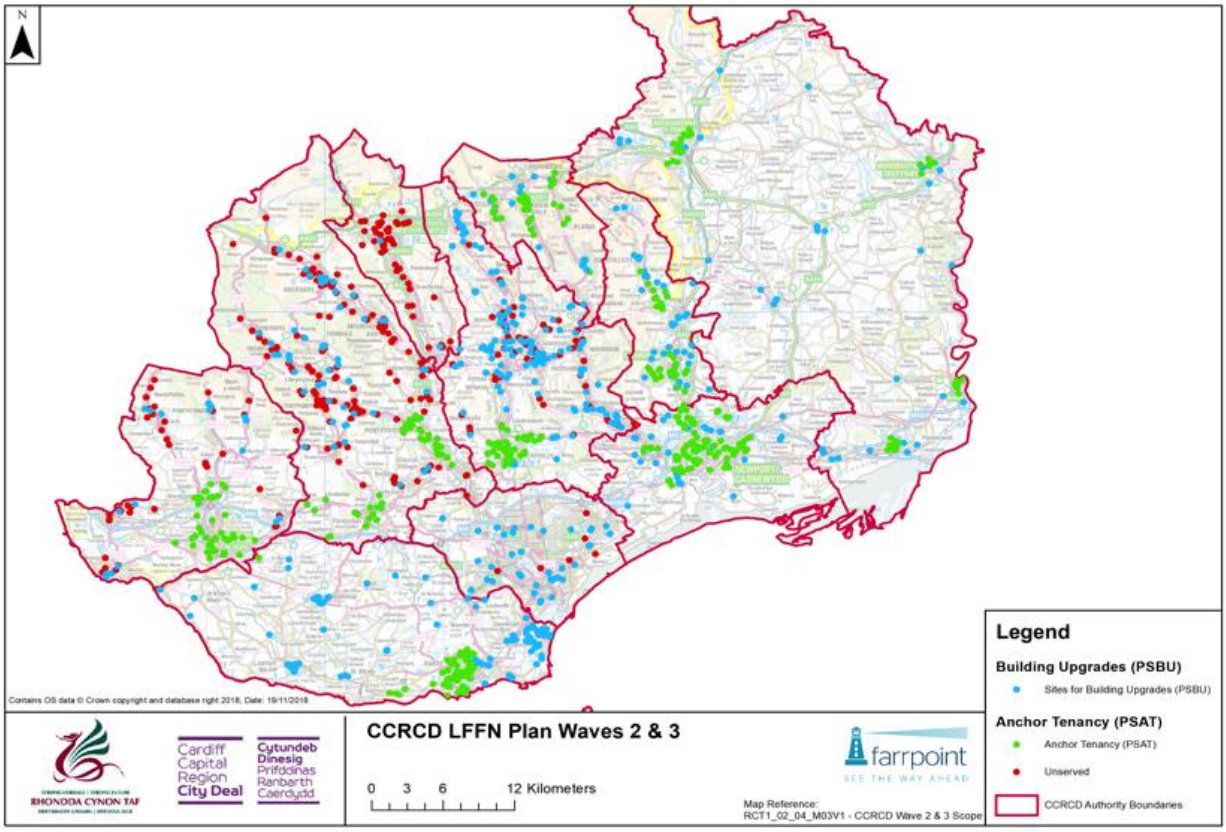


Figure 3 – Scenarios for the deployment of fibre and duct infrastructure into the region.

In the map above:

- Green areas are those into which CCRCD wishes to support new fibre and duct investment to align with development zones
- Pale blue sites are public sites in rural areas in the region lacking existing fibre infrastructure in summer 2018 (note since this time PSBA has invested in a number of these sites) which are candidates for upgrade from rural programmes

The full fibre build across the cities/ development zones may be addressed in a number of ways and, indeed, different approaches may be required in different parts of the region. We envisage the following:

- 1) In areas such as the M4 corridor a duct build programme will be required to be complementary to the trunk road initiative. This will need to be undertaken and used by the local authorities and commercialised alongside the Trunk Road and Greenlink initiatives by commercial partners. The has significant corporate demand from the transport and energy sectors.
- 2) In other areas there is a commercial appetite for investment and believe there will be a blend of public sector duct usage, PIA and new commercial build.
- 3) In more rural areas a public site upgrade approach would be adopted, notably those sites currently on copper infrastructure.

This revised bid to DCMS LFFN is focussed on the upgrade of largely rural public sector sites from copper to fibre infrastructure as described in Point 3 above

It should be noted that this represents a refocusing of the proposed intervention to align with PSBA technical and commercial considerations and the refocusing of the LFFN programme on the need for enhanced rural infrastructure.

Rural communities in the region have long suffered from poor internet connectivity. Ofcom's data shows the comparative across local authority areas in the region and that against UK and Wales. Ultrafast defined as service with greater than 300Mbs, Superfast is above 30Mbs, but below 300Mbs.

Ofcom data also shows those **unable** to receive minimal internet connectivity.

Authority	Full Fibre % of Premises Served	Ultrafast % of Premises Served	Superfast % of Premises Served	Premises Below USO
Blaenau Gwent	1.0%	1.0%	96.9%	246
Bridgend	4.7%	4.7%	94.7%	514
Caerphilly	0.4%	0.4%	95.9%	432
Cardiff	3.3%	59.8%	97.8%	626
Merthyr Tydfil	2.0%	2.0%	95.4%	134
Monmouthshire	5.2%	5.2%	83.8%	3254
Newport	2.2%	62.8%	97.4%	586
Rhonda Cynon Taf	1.8%	9.4%	96.4%	728
Torfaen	2.2%	2.2%	95.8%	358
Vale of Glamorgan	3.1%	46.9%	94.6%	1336
				8214

Figure 4 - Ofcom Broadband Data

Existing arrangements

The challenge of bridging the rural gap is recognised by both the UK and Welsh Government and a range of initiatives are either planned or in place including;

- Access Broadband Cymru (ABC) scheme; A De Minimis grant of £400 or £800 towards the installation costs of a better broadband connection
- DCMS Local Full Fibre Network Fund (LFFN Wave 3 & 4) will fund investment into public sector sites in rural areas
- The Welsh Govt is considering setting up a national Dynamic Purchasing Scheme to enable local additional investment to Superfast Cymru
- Universal Service Obligation – USO – introduced in UK legislation March 18 grants a right for residents and businesses with <10 Mbps to order a connection with a grant **up to £3,400** towards delivery. This figure is important as it will

result in many premises in the region remaining below the USO as the cost of delivering the service exceeds this amount. Ofcom is running consultation on the practicalities of implementing USO (suppliers' responsibilities, geographic split, services and technologies.

- DCMS Rural Gigabit Connectivity Fund provides connectivity in the most remote 10% of rural sites. The scheme will provide funding to connect rural hubs in a village or market town with a fibre connection. This must be a public sector site such as GP, health centre, library or school. Vouchers will then be given to SMEs (and possibly residents) in proximity to this site to get connections. It is expected that DCMS will make available connection vouchers to rural SMEs and residences in the region in 2019/2020.

CCRCD fully supports these Welsh Govt and UK Govt initiatives and would not replicate such programmes. Any intervention funded by LFFN for CCRCD will be complementary.

3 Economic Case - Scope of Project

The outcomes from the CCRCD strategic case are to ensure that:

- Cities and development zones have access to world class full fibre infrastructure to deliver economic growth and inward investment
- CCRCD is at the forefront of development and roll out of world class wireless technologies
- ***There is equality of access to digital connectivity across the region and all public sector sites are full fibre enabled***
- The region is a leader in open data provision and usage.

Through a series of meetings and workshops with PSBA and DCMS analysis these themes have been prioritised and redefined and it has been agreed that the emphasis will be on the upgrading of public sector sites across the region currently utilising copper infrastructure.

As discussed in the strategic case there are a range of both national and Welsh Government Initiatives to address requirement to in-fill rural broadband coverage. However, it is likely that there will remain a significant gap in service provision in the region, even after the role out of Superfast Cymru 2 and Rural Gigabit Connectivity interventions.

The proposed programme is fully complementary to these initiatives and will involve the PSBA upgrading 285 sites from copper to full fibre infrastructure, possibly using Openreach FFIB or an equivalent technical solution. (Note a list of the sites is provided in Annex 1)

A map of the proposed sites is presented below;

ADD PICTURE HERE

4 Commercial Case

4.1 Background

This section presents the commercial case for the proposed option. The following sections discuss in turn:

- Potential procurement routes
- Service requirements

4.2 Procurement Strategy

The chosen procurement strategy will take into account existing contractual arrangements and the role of the Welsh Government and the Public Sector Broadband Aggregation (PSBA). It is used by all authorities in the region from which they source connectivity services and service wrap. It is desirable that any new infrastructure or services procured is via the PSBA.

It is NOT proposed that CCRCD undertakes its own procurement as this would replicate other UK and Welsh Govt initiatives.

Should CCRCD wish at any point to directly fund rural broadband procurement the optimum procurement path is through the use of other existing procurement facilities, but against CCRCD provided scope. Several options may be available, including working through Welsh Government procurement channels.

Possible state aid compliant procurement routes open to CCRCD are:

- PSBA; This can be the used for connection of the public sector estate in rural areas and PSBA is already in discussions with some of the local authorities in the region on this matter. (Note; If CCRCD is successful in obtaining funding from the DCMS Wave 4 Rural Gigabit Connectivity Programme which seeks to drive fibre into public sector hubs in rural locations the PSBA can also be used for delivery under this programme)
- Welsh Government Dynamic Purchasing System; The Welsh Govt is considering establishing a Dynamic Purchasing System whereby the region can call off its requirements from an approved list of suppliers under the shelter of a national state aid clearance. At the time of writing this scheme is yet to be finalised but CCRCD will liaise with Welsh Govt on this matter to ensure its technical and commercial requirements are addressed in the design of the scheme

4.3 Service Requirements

All public sector sites will be connected with Gigabit capable passive infrastructure. Typically this will be provided utilising Openreach FFIB or an equivalent infrastructure platform

This will ensure all public sector sites have the same infrastructure that is able to carry all available fibre based services from Gigabit capable Broadband, Ethernet and also Optical high bandwidth services.

Full details of such infrastructure is provided in the enclosed link

https://www.openreach.co.uk/orpg/home/products/ultrafastfibreaccess/fullfibreinfrastructurebuild/ffib/downloads/ffibfactsheet.pdf

Individual public sector sites will have a choice of procuring a full portfolio of PSBA services to be delivered over this infrastructure. This will include Fibre to the Premises (GEA-FTTP) broadband, Ethernet leased lines, or Very High Bandwidth services.

Depending on the choice and speed of services required there may be a requirement to upgrade customer premise equipment.

5 Financial Case

5.1 Introduction

This section presents the financial case for the streams of work defined . Key assumptions are;

- LFFN funding is used to finance all the upgrades of copper infrastructure to the chosen public sector sites. This will include multi-purpose nodes and upgrade of the passive infrastructure
- Gigabit routers (CPE) at customer premise
- All PSBA connection and overhead charges for the public sector site to access the gigabit capable service

In additional the following points should be noted:

- **Revenue expenditure:** Public sector organisations using the infrastructure will be responsible for the on-going charges for active services at speeds aligned with their requirements
- **PSBA** will be responsible for the procurement of the gigabit capable site upgrades and all subsequent.

5.2 Capital Expenditure

This section presents the capital expenditure profile for each of the capital expenditure items and presented in Figure 5 below. The following points should be noted;

- all capital expenditure will be incurred by March 2021
- 285 sites are upgraded and fully connected to PSBA services
- CPE equipment will be upgraded at all sites
- It is assumed 50% of sites are upgraded in 2019/20 and 50% in 2020/21

Detailed quotations were obtained from PSBA and Openreach. These are available upon request. The key financial parameters are:

- The total cost for the installation of FFIB across the 285 sites was £5,646,931 at an average of £19,813 per site
- The PSBA install price is £3,186 per site as shown below. This is a blend of equipment and installation activities. Note that this cost is for FttP – 330/30. The price would fall to £1686 per site if FttP – 80/20 was delivered instead.

Quantity	285
Product	Fibre to the Premise (FttP)
Speed	330/30
EVC	150Mb
Router Type	Cisco 4331/K9 & FL-4330-PERF-K9
Accessories*	2 X GLC-TE & 2 x 3M Cat5e cables
Circuit Installation	£0
Router Price	£1,668.85
Accessories Price*	£316.66
Project Management	£736.42
Technical Support Group and Field Engineering	£464.32
INSTALL PRICE (1 circuit)	**£3,186.26**
TOTAL INSTALL PRICE (285 circuits)	**£908,084.10**
Circuit Recurring	£824.18
Router Maintenance	£223.30
Service Management	£121.20
ANNUAL RENTAL PRICE (1 circuit)	**£1,168.68**
TOTAL ANNUAL RENTAL PRICE (285 circuits)	**£333,073.80**
TOTAL 3-YEAR RENTAL PRICE (285 circuits)	**£999,221.40**

- There is an annual rental cost to the public sector of £1,168 per site for FttP 330/30. This falls to £718 for Fttp-80/20. It is to be agreed at the time of writing if this on-going rental cannot be claimed for LFFN or whether the first three years can be capitalised.
- All costs are subject to survey

Project Capital Expenditure			
(£m)	**Year 1 (19/20)**	**Year 2 (20/21)**	**Total**
Passive infrastructure upgrade **(assume 285 sites @ £19.8k/site)**	2.821	2.821	**5.643**
PSBA Installation Price **(assume 285 sites @ £3.186k per site)**	0.454	0.454	**0.908**
Total	**4.33**	**4.32**	**6.551**

Figure 5 - Capital Expenditure Profile Itemised

Future Generations Assessment

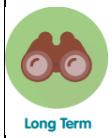
Name of the Officer completing the evaluation: **Kellie Beirne** **Phone no: 07826 919286** **E-mail: kellie.beirne@cardiff.gov.uk**	**Please give a brief description of the aims of the proposal** The proposal aims to seek cabinet support for future direction on Digital within CCR.
Proposal: Digital way forward	**Date Future Generations Evaluation form completed: 8 July 2019**

1. **Does your proposal deliver any of the well-being goals below?** Please explain the impact (positive and negative) you expect, together with suggestions of how to mitigate negative impacts or better contribute to the goal.

Well Being Goal	**Does the proposal contribute to this goal? Describe the positive and negative impacts.**	**What actions have been/will be taken to mitigate any negative impacts or better contribute to positive impacts?**
A prosperous Wales Efficient use of resources, skilled, educated people, generates wealth, provides jobs	Digital is an underpinning requirement for economic growth and social prosperity.	The actions taken to maximize impact are around: • Development of shared approach with WG • Industry-led commercial infrastructure development
A resilient Wales Maintain and enhance biodiversity and ecosystems that support resilience and can adapt to change (e.g. climate change)	The proposal reflects a desire to move forward with the digital agenda in ways which impact social, economic and wider wellbeing goals, ensuring we are resilient in the face of future challenges. e natural environment	A focus on data and evidence and the underpinning nature of digital in relation to EV, LEV air quality and active travel all demonstrate the key objectives with which digital interfaces.
A healthier Wales People's physical and mental wellbeing is maximized and health impacts are understood	Digital connectivity is a 'hygiene factor' and seen today, as the fourth utility	

Well Being Goal	Does the proposal contribute to this goal? Describe the positive and negative impacts.	What actions have been/will be taken to mitigate any negative impacts or better contribute to positive impacts?
A Wales of cohesive communities Communities are attractive, viable, safe and well connected	Appropriate levels of connectivity across the region are key to enhancing coherence and connectedness of communities	LFFN bid has been repositioned CCR-wide
A globally responsible Wales Taking account of impact on global well-being when considering local social, economic and environmental wellbeing	As above – digital connectivity is a core service and requirement for communities and businesses and educational establishment.	
A Wales of vibrant culture and thriving Welsh language Culture, heritage and Welsh language are promoted and protected. People are encouraged to do sport, art and recreation	Digital offers a key means of optimizing this.	
A more equal Wales People can fulfil their potential no matter what their background or circumstances	This proposal goes to the heart of inclusive growth and ensuring equity of provision and equality of access.	

2. How has your proposal embedded and prioritized the sustainable governance principles in its development?

Sustainable Development Principle	Does your proposal demonstrate you have met this principle? If yes, describe how. If not explain why.	Are there any additional actions to be taken to mitigate any negative impacts or better contribute to positive impacts?
 Balancing short term need with long term and planning for the future	Digital is an underpinning future industry that is central to the success and sustainability of all economic sectors and plays a significant social role.	The report sets out need for a digital plan for CCR which will cover short, medium and long-term aims
 Working together with other partners to deliver objectives	The proposal is a partnership with WG, other public bodies and businesses.	
 Involving those with an interest and seeking their views	This approach has straddled regions, sectors, businesses, skills bodies, government groups and universities.	
 Putting resources into preventing problems occurring or getting worse	The project supports growth in a long-term high-productivity through a core digital connectivity offer. This will help ensure data, digital competency and bandwidth is in place to support growth and prosperity for all.	
 Considering impact on all wellbeing goals together and on other bodies	The proposal is central to delivery of all wellbeing goals.	

3. **Are your proposals going to affect any people or groups of people with protected characteristics?** Please explain the impact, the evidence you have used and any action you are taking below.

Protected Characteristics	Describe any positive impacts your proposal has on the protected characteristic	Describe any negative impacts your proposal has on the protected characteristic	What has been/will be done to mitigate any negative impacts or better contribute to positive impacts?
Age	The proposal for base connectivity should be open to all and accessible to all. This makes the case to plan digital infrastructure development to bring a whole region to life.	None arising – although particular attention will have to be paid to how the message and opportunities is conveyed as consistently as possible to all businesses and communities.	Planning through the Regional Skills Partnership
Disability	The proposal for base connectivity should be open to all and accessible to all		
Gender reassignment	The proposal for base connectivity should be open to all and accessible to all	As above	
Marriage or civil partnership	As above	As above	
Pregnancy or maternity	As above.		
Race	As above.		
Religion or Belief	As above.		
Sex	Again, should the proposal be successful, proper regard will be had to working conditions and rights and ensuring equity. Efforts in this regard need to be twinned with more support for women in particular in STEM related work.	Proportion of women employed in STEM related professions is generally lower than that of male counterparts.	Data and evidence through the activities of the RSP to inform any potential need for targeted recruitment processes.
Sexual Orientation	As with all of the section above.		

Protected Characteristics	Describe any positive impacts your proposal has on the protected characteristic	Describe any negative impacts your proposal has on the protected characteristic	What has been/will be done to mitigate any negative impacts or better contribute to positive impacts?
Welsh Language	We will discharge all of our duties in relation to the Welsh language Act.	Not at this time but the situation will be kept under review.	

4. Safeguarding & Corporate Parenting. Are your proposals going to affect either of these responsibilities?

	Describe any positive impacts your proposal has on safeguarding and corporate parenting	Describe any negative impacts your proposal has on safeguarding and corporate parenting	What will you do/ have you done to mitigate any negative impacts or better contribute to positive impacts?
Safeguarding	Any work with young people or in the context of schools/ learning establishments, will have proper regard to Safeguarding requirements and policy compliance.	Safeguarding is about ensuring that everything is in place to promote the well-being of children and vulnerable adults, preventing them from being harmed and protecting those who are at risk of abuse and neglect.	
Corporate Parenting	Opportunity exists to advise and support our young people about the potential for careers, growth and personal development through engagement with this sector		Ensure information about the industry in which the ten LAs are investors – is conveyed to and shared with young people in the care of the LA. Consideration should be given to city deal employment opportunities being more closely referenced in Corporate Parenting Policies and Strategies.

5. What evidence and data has informed the development of your proposal?

- Data and evidence
- Academic research
- Impact assessments
- Global reports and predictions
- Future trends
- Work to date by Cube Ultra

6. SUMMARY: As a result of completing this form, what are the main positive and negative impacts of your proposal, how have they informed/changed the development of the proposal so far and what will you be doing in future?

The proposal is a speculative one at this stage and pre-submission of EOI.

7. ACTIONS: As a result of completing this form are there any further actions you will be undertaking? Please detail them below, if applicable.

What are you going to do	When are you going to do it?	Who is responsible	Progress
Ensure the plan for digital connectivity is monitored to optimize and maximize contribution to wellbeing goals – e.g. prosperity, connected communities and opportunities through data and evidence to plan, prevent and shape behavioral change.			

8. MONITORING: The impacts of this proposal will need to be monitored and reviewed. Please specify the date at which you will evaluate the impact, and where you will report the results of the review.

The impacts of this proposal will be evaluated on:	**July 2020**