Unlocking value with rural broadband: a policy rethink

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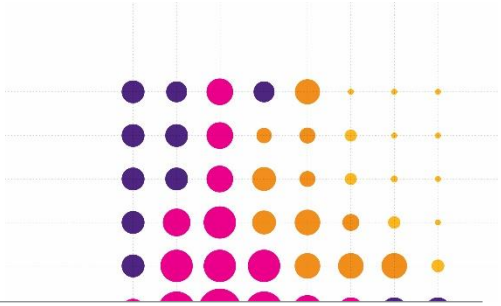

Access to affordable and adequate broadband services is becoming increasingly important, as the digital component of national economies continues to grow. In this paper, we focus on the question as to how policy and strategy can be developed to enable efficient rollout of broadband services meeting the needs of rural areas, using the UK as an example. We focus primarily on fixed service developments, but note that similar issues apply in the mobile sector. We examine a range of government and regulatory approaches currently available, noting that multiple initiatives can lead to confusion, inefficiency, and delays, undermining key objectives. Whilst focus on fibre and 5G may be beneficial in the long run, value in the nearer term may be gained through the practical recognitions where: markets are far from homogeneous, not all end-users may require gigabit services, and not all solutions may be affordable. We suggest that a more coherent approach may be beneficial, with policy designed to align with national targets, yet remaining flexible enough to accommodate change and immediate market needs.

The rural challenge

Rural areas are classified, in the main, as those with lower population densities.

Delivery of adequate telecommunications services to rural areas is a challenge in many countries, and certainly not a new one. Fundamentally, this is because of the sparseness of users in rural areas and the technical, operational, and economic difficulties that arise in serving them. Difficult terrain can also be a key factor. In many cases, suitably attractive private investment cases can be hard to establish, and timescales to deploy solutions can be excessive. Firms can be reluctant to deploy internal subsidies, which may not align with shareholder objectives.

However, rural areas can provide important economic contributions at national levels, and industry and governments are keen to avoid the so-called 'digital divide' – where divergence in service quality levels can leave rural communities behind, both socially and economically. Consequently, public intervention is often required to deliver adequate service outcomes.

Of course, one can question 'what is adequate?' With the ever increasing importance of digital infrastructure to modern service based economies, 'adequate' means reliable, affordable, and comprehensive access to good quality internet services. As rollout of optical fibre and 5G wireless becomes national priority for industry and policy makers in many regions, with promises of better service, resilience, and cost efficiency, questions arise as to affordability, rollout rates, and match to market needs.

Does rural connectivity matter?

Digital infrastructure, as a critical enabler to digital services based economies, is widely reported to add incremental economic value. A recent study[1] commissioned by Ofcom found evidence of a causal relationship between investment in broadband solutions and economic growth, with an increase of around 0.5% in GDP per annum, or several percentage points on national GDP over a sustained period.

Recent analysis by Plum[2] has investigated the economic benefits of bringing digital infrastructure to rural areas. We reviewed economic data for the UK market and noted that broadly, today, some 17% of population are recorded as residing in rural areas, which cover around 75% of the landmass.

Previous studies[3] have indicated that economic contribution, in terms of GVA, from rural regions amounts to around £300bn or 16% of the national economy, compared, respectively, with London at £425bn and 23%. With London as the largest UK city, at an overall level, the UK's rural economy is 'worth', collectively, more than many major conurbations.

> **"Some of the biggest economic opportunities are in the rural parts..."**
>
> ***Secretary of State for Business, Energy and Industrial Strategy***

We estimated that over several years, the UK's rural economy could stand to benefit by several percentage points on GVA with developments of digital infrastructure (around £17bn over 10 years). These figures are further substantiated by published data[4] on observed benefits and recent studies[5]. Further benefits could also be possible; for example, better access to public and government services, reduced travel and commuting, growth of new businesses, and social cohesion.

In short, rural areas typically contribute materially to national economies, and digital connectivity can be expected to bring incremental benefits.

Rural areas remain behind

Latterly, there is a trend for policy makers to promote the development of fibre-based infrastructure, initially with focus on hybrid copper-fibre networks, and more recently 'full fibre', to provide robust digital networks. These are increasingly seen as critical infrastructure. 5G wireless also features prominently in national policies, for example, with the UK Government's Future Telecommunications Infrastructure Review[6].

In Europe, The European Electronic Communications Code (EECC)[7] provides an updated regulatory framework to reflect evolving market needs and solutions. The Code seeks to promote deployment of 'very high capacity' infrastructure such as fibre and 5G networks, and also requires that affordable adequate broadband services be accessible for all end-users. Specific details of these proposals remain subject to national implementations and ongoing review.

However, replacement of copper networks is both capital intensive and time consuming, and with economies of scale and maturity yet to develop in the 5G market, the question therefore arises as to whether singular focus on particular solutions is appropriate. Further, market need has been questioned by some industry players.

> **"Demand in hard to reach areas is for broadband that works, now, and at acceptable cost."**
>
> ***CEO, UK-based rural telecoms operator***

With a long history in copper networks, and despite a good ongoing flow of capital investment in fibre networks from both Government and private investors, the UK still ranks low in full fibre connectivity by international standards.

As of January 2019, only around 7% (2.1m) of the UK's 30m premises had access to full fibre connections[8]. Ongoing developments are progressing this accessibility at around 1m premises per year, although this rate of progress is driven significantly by initial build-out in urban areas where density of premises renders a level of both cost and time efficiency; efficiencies will be lower outside urban areas.

Access to high quality fixed broadband services in rural areas in the UK remains limited. Recent data and review indicates the following situation[9],[10],[11]:

- Around 10% of premises (c. 600k) in rural areas cannot access USO level services.
- Around 20% of premises (c. 1.2m) in rural areas are unable to access superfast service levels due to long or low quality copper local access lines, and as the Government's BDUK funding programme draws to a close around 2022, increases in access to superfast services are likely to slow down.
- Government has identified that approximately 10% of UK premises (c. 3m), largely in rural and remote areas, would be unlikely to receive gigabit-capable connections commercially by 2033.
- Around 33% of the UK landmass does not have 4G coverage from all mobile operators, 9% of landmass has no 4G at all, and in rural areas c. 58% of premises do not have access to 4G services indoors from all four operators[12].

Complexity drives inefficiency

Various public initiatives and proposals have been developed, addressing regional, national, and rural areas. We provide a summary of these in Figure 1, noting some key attributes.

Whilst some good successes have been achieved with individual policies, the variety of schemes is resulting in complexity and uncertainty in the market – particularly around applicability of funding to particular solutions.

Eligibility on the UK's broadband USO scheme is blocked if other public schemes are expected to roll out in areas over a one year period. In Scotland, R100 scheme developers have been concerned not to build out where the USO may be invoked, and USO providers are concerned about overbuild from other public schemes before investments are recovered. There are also concerns that the USO will fail for many where line costs will exceed the £3400 cap, and confusion remains on what 'gigabit capable' means.

Inefficiencies and delays are also evident. For example, the UK's broadband USO will have taken over 4 years from initial announcement to effective implementation. In Scotland, the R100 programme is running around one year late, with concerns over costs and available budget to meet slated targets.

National policy singularly focused on rollout of 5G and full fibre is right for the long term. However, this should not be at the expense of missing end-user demand in the immediate and near terms.

In summary, fragmented approaches may not be efficient, and can give rise to significant gaps:

- Market gap: Various stakeholders with both public and private sector interests in rural areas have commented that the specification currently defined by the Universal Service

Figure 1: Summary of selected existing initiatives – UK market

Attributes and comments	BDUK	Gigabit vouchers	LFFN	USO	Scottish R100	RGC	Ofcom RAB fibre model	Ofcom shared spectrum
Funding	Government	Government	Government	Industry	Government	Government	Industry	Industry
Business model	ISP bids	User vouchers	ISP bids	User requests / cost subsidies	ISP bids / cost subsidies (TBC)	User vouchers	RAB model on Openreach investment	ISP bids
Coverage / eligibility	Sub- 24Mbps postcodes	National	National / public sector bodies	Sub- 10Mbps premises	Sub- 30Mbps areas in Scotland	Sub- 30Mbps public sector hubs	Ofcom defined areas	Subject to Ofcom approvals
End-user service	Superfast / 24Mbps	Ultrafast / 100Mbps	Ultrafast / 1Gbps	10Mbps down / 1Mbps up	Superfast / 30Mbps	Superfast / 30MBps	Ultrafast / 100Mbps	Technology dependent
Technology focus	FTTC, now FTTP	'Gigabit capable'	'Gigabit capable' / FTTP	£3400 cost per line / £45 pcm threshold	Proportion of premises 'gigabit capable'	'Gigabit capable'	FTTP	Neutral
Comments	Closure expected in 2022	Limited take-up in rural areas, due cost	Public sector focus; limited take-up in rural areas due cost	Service level below market needs. Many premises over cost threshold	Targets missed; likely to require additional funding	Public sector focus; limited budget of £200m	Contentious, under development	Case by case. Potential for higher power licences

Obligation (USO) (10 Mbps downlink, Mbps uplink) is not sufficient to meet the needs of users in rural areas. Broadly, 'adequate' now means superfast or better service quality, at affordable prices (around £30 pcm for services): more than a few Mbps on long length DSL copper lines, but not necessarily ultrafast (100 Mbps or more) on full fibre. Not all end-users need or want ultrafast services now.

- Cost gap: 5G and fibre may not be the most cost efficient solutions for rural areas. New technologies are naturally more costly during early stages of market development, as economies of scale are typically not well developed, and vendors seek to recover R&D investments with relatively high margins. With 'fragile' investment cases in rural areas, there is therefore some tension in deployment of novel solutions. This calls for innovative ways of thinking; for example, leverage of established technology elements and scale economies, with 'modifications' to fit rural market requirements. (See case example below*).
- Timing gap: Comprehensive rollout of 5G and fibre networks to rural areas is likely to take some years; meanwhile, end-users need adequate broadband solutions now and in the mid-term.

Mobile matters too

Our primary focus in this paper has been towards fixed broadband services in rural areas. However, mobile service also matters, and there is a degree of overlap between fixed and mobile markets, as mobile technology solutions can be used to provide fixed services. For example, 4G LTE mobile technology is able to provide fixed wireless access to internet services at superfast speeds[13], with commercial services deployed.

The situation with mobile coverage in rural areas remains fluid. Various solutions, such as geographic spectrum sharing, national roaming, and extended infrastructure sharing are being mooted.

Similar issues will apply; whilst broad 5G coverage remains a worthwhile ambition (and will require fibre access networks), a coherent and coordinated policy is likely to deliver more effective outcomes than a manifold of initiatives.

Case example: full fibre and wireless access*

Cost and performance are of course relative. We provide a short case example to illustrate typical levels, based on current market activity.

We assume a greenfield situation, where new infrastructure is built, and use capital cost per connected line as a key metric in comparing solutions. Service performance levels can differ across solutions; we base our assessment on a minimum service level of 30Mbps with contention to no greater than 4Mbps average (ensuring support for streamed video).

Capital cost on full fibre solutions ranges according to market conditions; a typical mean cost in non-urban areas is around £1900 per line.

Capital cost on 5GHz wireless access solutions in rural areas is around £20k per site, with around 50 customers supportable at

typical performance levels of 200-300Mbps over 30MHz sector carriers, thus £400 per line.

Additional costs apply in all cases for backhaul, customer premises equipment, and supporting systems. Cost structure can be very variable according to particular market conditions, and good returns on investments may be possible through examining situations on a case by case basis, with an appropriate mix of technologies, and with sufficient granularity.

Whereas satellite solutions are available in the market, these tend to be relatively costly, and suffer from limited service quality levels, including high latency, high contention, data caps, and signal drop-outs.

Time for a rethink

Full fibre and 5G will provide valuable digital infrastructure solutions in the long term and are the right goals for national policy. However, blind ambition and singular focus on these technologies should not prevent adequate solutions for those in rural areas still struggling with the lowest broadband speeds.

Various national initiatives have been successful in increasing availability of superfast and full fibre services. However, the variety of schemes in some regions is now causing confusion and inefficiencies, resulting in some rural areas remaining 'digitally stranded'. The time may be right to rethink interventions, with a critical eye on closing key gaps such as end-user service needs, time to market, and returns on investment.

A less fragmented approach supporting rollout of broadband infrastructure is needed, with recognition of the variability of regions, market requirements, available solutions and cost structures, and levels of competition.

Design of any new approach will need to set clear objectives, taking account of available budgets, regulation, industry positioning, and also relevant factors such as state aid rules and regional frameworks.

A coherent approach, leveraging experience and positive elements from various schemes may be the way forwards – removing uncertainty, and enabling effective return on valuable and limited resources.

About Plum

Plum is a leading independent consulting firm, focused on the telecommunications, media, technology, and adjacent sectors. We apply extensive industry knowledge, consulting experience, and rigorous analysis to address challenges and opportunities across regulatory, radio spectrum, economic, commercial, and technology domains.

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[1] See: https://www.ofcom.org.uk/research-and-data/telecoms-research/broadband-research/economic-impact-broadband
[2] See: https://plumconsulting.co.uk/5g_the_rural_opportunity/
[3] See: https://ruralengland.org/wp-content/uploads/2018/03/Unlocking-digital-potential-website-version-final.pdf
[4] Superfast Cornwall: "our evaluations work shows huge economic, social and environmental benefits from the rollout across Cornwall and Isles of Scilly – e.g. 3,500 / 4,200 jobs created / safeguarded, £300m of GVA impact and 3,850 new businesses (as at 31/3/2018)". See: https://www.superfastcornwall.org/current-programme/evaluation-2011-2015-programme/
[5] See: https://publications.parliament.uk/pa/ld201719/ldselect/ldrurecon/330/330.pdf
[6] See: https://www.gov.uk/government/publications/future-telecoms-infrastructure-review
[7] Official Journal of the European Union, Volume 61 (December 2018): https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2018:321:FULL&from=EN
[8] See: https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-update-spring-2019
[9] See: https://www.ofcom.org.uk/__data/assets/pdf_file/0021/146613/connected-nations-update-spring-2019.pdf
[10] See: https://ruralengland.org/wp-content/uploads/2019/02/SORS18-Full-report.pdf
[11] See: https://www.gov.uk/government/news/200-million-rollout-of-full-fibre-broadband-begins
[12] We note that Ofcom's mobile coverage data is derived using propagation modelling; in many cases, this has proven inaccurate, and crowd sourced data may be preferable.
[13] Quality of service however may not be sufficient to support continuous / streamed services reliably.