Superfast broadband for Scotland

Further progress update

AUDITOR GENERAL

Auditor General for Scotland

The Auditor General's role is to:
- appoint auditors to Scotland's central government and NHS bodies
- examine how public bodies spend public money
- help them to manage their finances to the highest standards
- check whether they achieve value for money.

The Auditor General is independent and reports to the Scottish Parliament on the performance of:
- directorates of the Scottish Government
- government agencies, eg the Scottish Prison Service, Historic Environment Scotland
- NHS bodies
- further education colleges
- Scottish Water
- NDPBs and others, eg Scottish Police Authority, Scottish Fire and Rescue Service.

You can find out more about the work of the Auditor General on our website: www.audit-scotland.gov.uk/about-us/auditor-general

Audit Scotland is a statutory body set up in April 2000 under the Public Finance and Accountability (Scotland) Act 2000. We help the Auditor General for Scotland and the Accounts Commission check that organisations spending public money use it properly, efficiently and effectively.

Contents
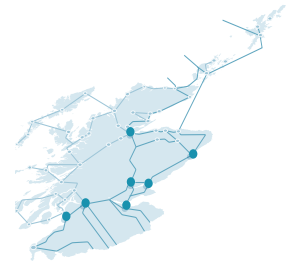
Audit team

The core audit team consisted of:
Graeme Greenhill, Morag Campsie and
Ashleigh Madjitey, with support from
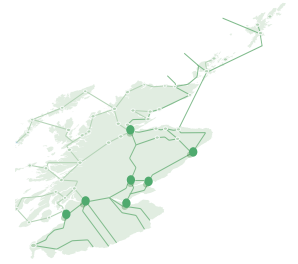other colleagues and under the direction of
Gordon Smail.

**Links**

PDF download

Web link

Exhibit data

When viewing this
report online, you can
access background
data by clicking on
the graph icon. The
data file will open in a
new window.

Key facts

Initial Scottish Government investment towards its 'Reaching 100 per cent' programme to connect every home and business to superfast broadband by the end of 2021

£600 million

The European Union's definition of superfast broadband which the Scottish Government has adopted

>30 Mb/s[1]
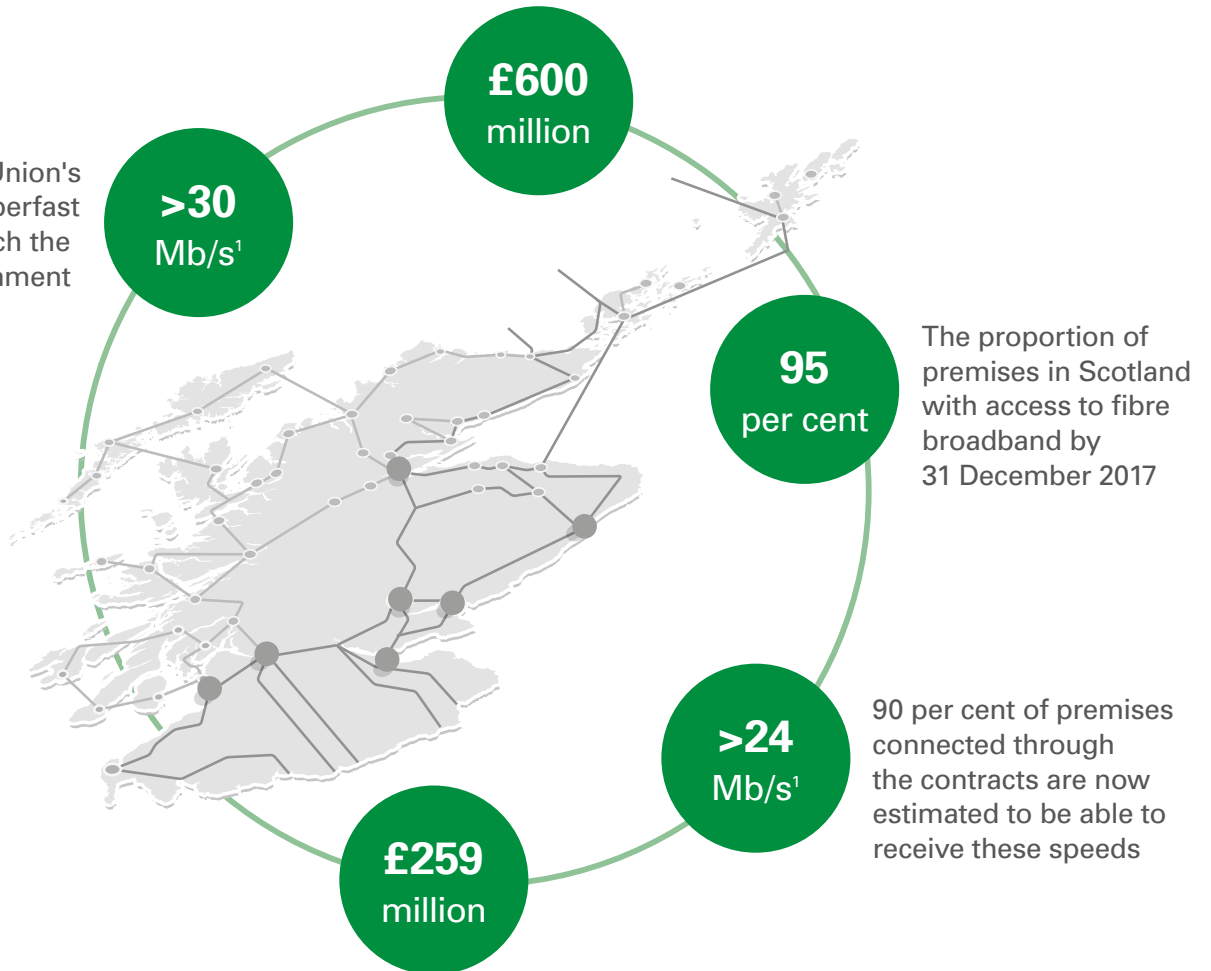
95 per cent

The proportion of premises in Scotland with access to fibre broadband by 31 December 2017

>24 Mb/s[1]

90 per cent of premises connected through the contracts are now estimated to be able to receive these speeds

£259 million

The total public sector spend for work to March 2018

Note: 1. Megabit per second. This is a common measure of data speed.

Summary

Key messages

1 The Scottish Government met its target of providing access to fibre broadband to 95 per cent of premises in Scotland by 31 December 2017. The Scottish Government and Highlands and Islands Enterprise (HIE) had paid BT £259 million by 31 March 2018 through two contracts. Higher than expected take-up and lower than expected costs are expected to allow the programme to reach 60,300 more premises than planned. Ninety per cent of premises connected through the contracts are now estimated to be able to receive speeds of greater than 24 Mb/s. The Scottish Government has still to fully assess the economic impact of its investment.

2 The actual broadband speeds people experience will vary depending on the technology used and their chosen broadband package. Average broadband speeds experienced have increased across Scotland but continue to be lowest in rural areas. Most of the areas with average speeds less than 24 Mb/s are rural, with around 25 per cent of rural premises unable to receive speeds of at least 10 Mb/s.

3 Community Broadband Scotland (CBS) did not deliver the anticipated benefits for rural community broadband projects. A review of CBS's role found that a lack of specialist skills, poor communication and complex tendering requirements contributed to lengthy delays and failed procurements. Community groups told us this has affected their confidence in the ability of the Scottish Government and HIE to deliver broadband to rural communities. HIE is now refocusing its efforts on other initiatives to ensure the benefits of broadband are realised.

4 The Scottish Government established its 'Reaching 100 per cent' (R100) programme in May 2016. This is to deliver its commitment that every home and business in Scotland will have access to speeds of at least 30 Mb/s by the end of 2021. The Scottish Government has committed £600 million in an initial investment to deliver superfast broadband to 147,000 premises, with contracts to be awarded in early 2019. Further investment may be required to reach all premises. It will be difficult for the Scottish Government to deliver its ambitions by the end of 2021.

5 The R100 programme is a key element of the Scottish Government's vision for a world-class digital infrastructure. Technology is constantly evolving, and the Scottish Government recognises the importance of installing infrastructure today that will be able to cope with future

> The Scottish Government met its target of providing access to fibre broadband to 95 per cent of premises

demands and new technologies. The Scottish Government must keep track of technological developments and commercial activities to ensure its future investment is properly planned and directed. It is yet to develop an overall strategy to map out and monitor all the commercial and public sector activity in this area including clear timescales and targets.

Recommendations

To ensure it can successfully deliver its vision for a world-class digital infrastructure the Scottish Government should:

- establish robust contract management and assurance processes to ensure the next round of contracts can deliver value for money

- have the right skills and people in place for the duration of the contract. Continuity will be critical as it is a complex programme requiring specific skills (programme management, financial, commercial, and technical)

- publish clear timescales for R100 by summer 2019 and communicate effectively with stakeholders so rural communities know what to expect, when, and can make decisions about how they want to proceed

- take account of lessons from CBS and the planned assessment of the benefits from the two contracts when developing the 'aligned interventions' voucher scheme as part of R100

- develop and publish an overall strategy for delivering its world-class vision which includes mapping out and monitoring existing and future digital infrastructure activities, and a realistic timetable with targets for delivery.

Background

1. The Scottish Government recognises that improved digital connectivity will provide a range of benefits including enhanced business productivity and international competitiveness. Digital connectivity is also expected to help transform the way in which people interact with public services. For example, people can consult with doctors online, pay council tax, and do school homework. A number of different technologies are available, and the Scottish Government has focused its efforts on introducing fibre broadband as far as possible. Full fibre is considered the best way to future-proof the network providing the capacity for greater speeds and improving reliability (Appendix, page 28).

2. We previously reported on the roll-out of superfast broadband in February 2015 and August 2016 and found the following:

- The Scottish public sector, the UK Government and the European Union (EU) expected to spend around £286 million on two contracts with BT to

2015

Superfast broadband for Scotland
A progress report
February 2015

Superfast broadband for Scotland
A progress report
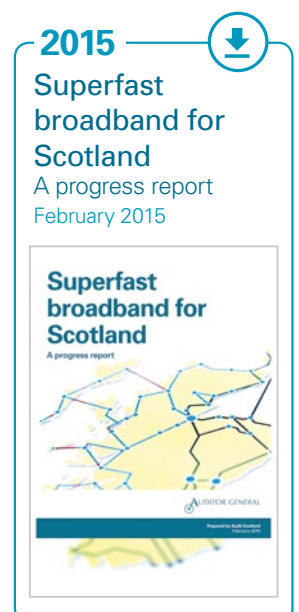
provide access to a fibre network to 95 per cent of premises in Scotland by December 2017.[1]

- BT met its interim target of 85 per cent coverage by March 2016 and was on track to meet the 95 per cent target. It was also surpassing its contractual commitments to provide speeds of at least 24 Mb/s to 77 per cent of premises in the contract areas.

- A number of factors influence the speed consumers experience. These include the type of broadband package that people buy and the quality of wiring inside and outside premises.

- There is high public interest in the roll-out of superfast broadband, but the Scottish Government could provide more information about the progress of the contracts and what speeds could be expected.

- The Scottish Government still had much to do to provide 100 per cent superfast broadband access through its 'Reaching 100 per cent' (R100) project, and to achieve its ambition of becoming a world-class digital nation by 2020. It has now changed its definition of superfast from 24 Mb/s to 30 Mb/s which is consistent with Ofcom and the European Union's definition.

The Appendix provides more information on broadband technologies and the Scottish Government's superfast broadband programme to date.

3. This report has two parts:

- Part 1 examines whether the Scottish Government achieved its target of providing access to a fibre broadband network to 95 per cent of Scottish premises by 31 December 2017.

- Part 2 examines the progress being made with the Scottish Government's plans to ensure 100 per cent of premises can access speeds of 30 Mb/s, as part of its vision to have world-class digital infrastructure.

About the audit

4. As part of this audit we did the following:

- Reviewed contract-monitoring documents from the Scottish Government and HIE and plans for R100 and world-class digital infrastructure.

- Reviewed publicly available data on the level of broadband coverage across Scotland from Ofcom and ThinkBroadband. This data shows commercial and public-sector infrastructure.[2]

- Spoke to representatives from the Scottish Government, HIE, CBS and Scottish Futures Trust (SFT) as well as communities affected by poor broadband availability.
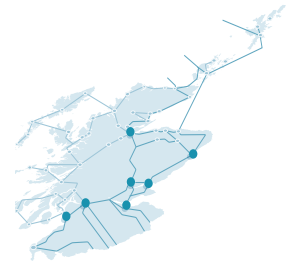
2016

Superfast broadband for Scotland
A progress update
August 2016

Part 1
Progress in delivering fibre broadband in Scotland

The Scottish Government achieved its target to provide access to fibre broadband to 95 per cent of premises by 31 December 2017

5. The Scottish Government's investment in expanding the fibre broadband network across Scotland is intended to provide access to superfast speeds with improved reliability.[3] The term fibre broadband covers all broadband technologies that have a fibre element, including fibre to the cabinet (FTTC) and fibre to the premises (FTTP – also known as full fibre) (Appendix).

6. The two contracts with BT were designed to provide access to fibre broadband to premises not covered by commercial plans. The contracts were also expected to deliver speeds of more than 24 Mb/s to 77 per cent of premises. The Scottish Government, Highlands and Islands Enterprise (HIE) and BT cannot guarantee the actual speeds premises will receive or experience. Speeds may vary due to technical and geographic reasons, and the actual broadband package a person buys from a supplier.

7. By the end of 2017, 95 per cent of premises in Scotland had access to fibre broadband. Of these, 890,000 gained access through the two BT contracts.[4] Without public-sector investment, only around two-thirds of premises in Scotland would have access to a fibre network.

8. The contracts with BT required that all council areas except Eilean Siar have at least 75 per cent coverage of fibre broadband. Eilean Siar's target was 70 per cent due to the area's remoteness and terrain. Coverage in all council areas has achieved the contracted targets (Exhibit 1, page 9).

BT has met its contractual commitments for available broadband speeds
9. Not all premises that can access fibre broadband will achieve superfast speeds, defined in the contracts as 24 Mb/s. The contracts specified that BT provide infrastructure which can deliver speeds of more than 24 Mb/s to 77 per cent of premises in the contract area. By the end of March 2018, the Scottish Government estimated that overall, 90 per cent of connected premises are able to receive these speeds (Exhibit 2, page 9):

- 92 per cent of premises connected under the contract in the rest of Scotland

- 84 per cent of premises connected in the HIE contract area.

2015

the UK Government checks and provides assurance on these figures

Paragraphs 84-88 (page 34)

Exhibit 1

Broadband coverage by local authority area
BT achieved its contractual commitments to expand fibre broadband coverage in all local authority areas.

Rest of Scotland   **Highlands and Islands**

Commercial coverage   Contracts with BT   ---- 75% target (70% target in Eilean Siar)
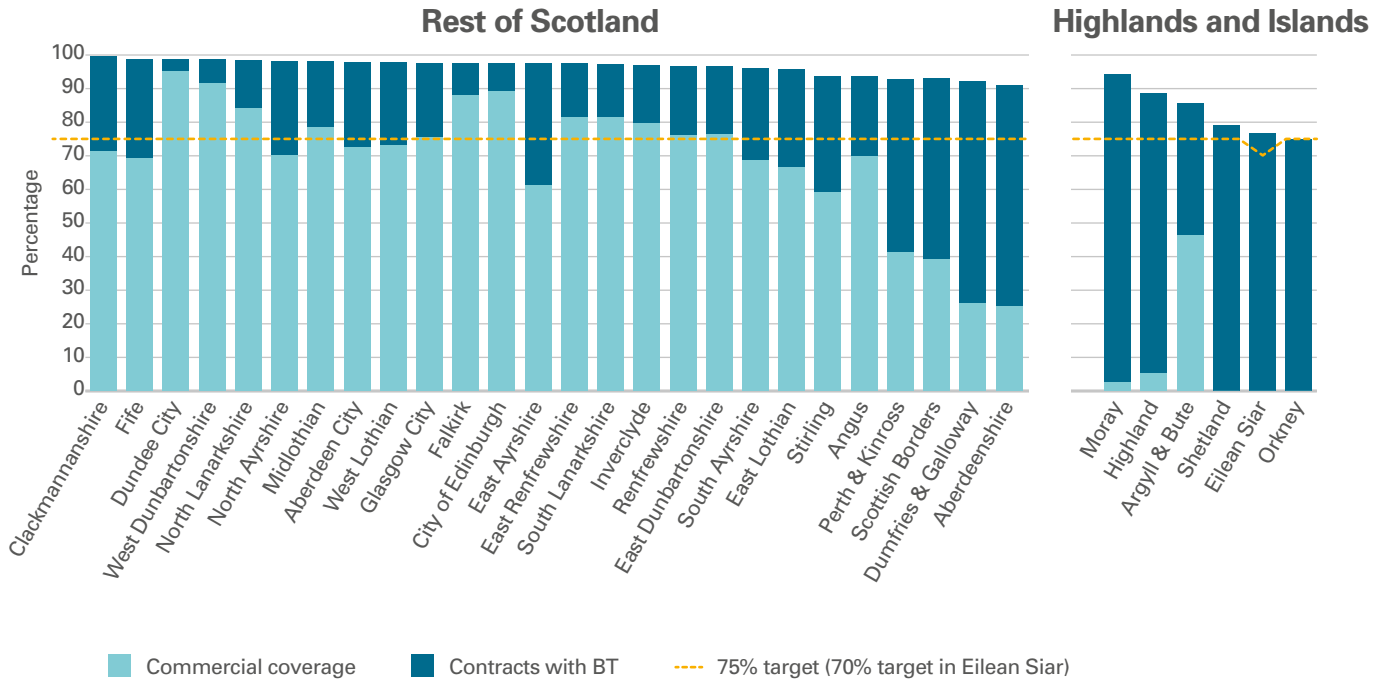
Note: The data presented includes premises where infrastructure was built by December 2017 but did not become operational until after that date.
Source: Scottish Government and HIE project-monitoring information

Exhibit 2

Modelled broadband speeds
The speeds delivered exceed those set out in the contracts.

>24 Mb/s

Unspecified or <24 Mb/s

10%   23%   77%   90%

Speeds delivered (2018)

Speeds commitment (as per contracts)
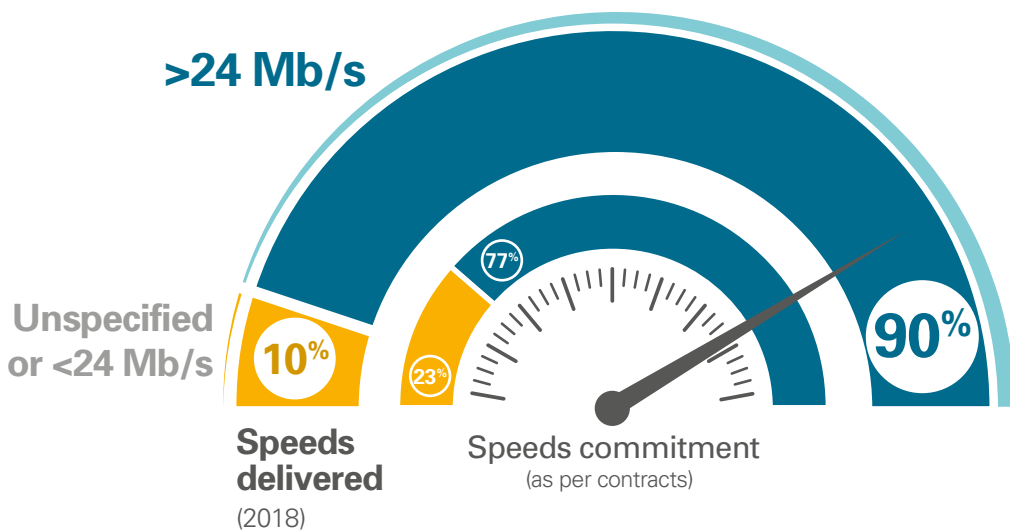
Source: Scottish Government and HIE project-monitoring information

Total spending under the contracts is now expected to be £442 million; the Scottish Government and HIE had paid £259 million by 31 March 2018

10. We reported in 2015 that the total investment through the two contracts was expected to be £412 million. BT was expected to contribute £126 million of its own money, with the total public sector contribution being £286.5 million, made up of:

- £165 million from the Scottish public sector including councils

- £101 million from the UK Government

- £20.5 million from the EU.

The Scottish Government and HIE are responsible for managing the contracts and paying BT on behalf of Scottish councils, the EU and UK Government.

11. The Scottish Government and HIE paid BT a total of £259 million for work carried out up to March 2018 (£149 million and £110 million respectively), £27 million less than originally planned. This has delivered fibre broadband access to 900,000 premises. Both contracts were extended to continue building infrastructure beyond the original completion date, using savings from the original contracts, remaining innovation funds and additional income generated (paragraphs 13–16).

12. Overall, BT, the Scottish Government and HIE expect to have invested £442 million when the build concludes in September 2019 (Exhibit 3, page 11).[5] The increased expenditure is due to BT investing £20 million of its own money as a result of extending the contracts and £18 million of additional income from higher than expected take-up. Under the terms of the contracts, this money is repayable to the Scottish Government and HIE's investment funds. They decided to use the funds to reinvest in the network. This is partly offset by a reduction in EU funding from £20.5 million to £12 million as a result of the Scottish Government developing its understanding of what elements of the project were eligible for EU support.

Higher than expected take-up and lower than expected costs mean 60,300 additional premises will gain access to the fibre network at no extra cost to the public sector

13. We reported in 2015 that the contracts contained clauses that could deliver additional funds for reinvestment from the following:

- Savings made if BT's costs to install the fibre broadband were lower than expected. BT is required to reinvest any savings made. For example, BT was able to deliver its targets for less by using a different mix of technologies meaning more money is available for BT to invest.

- A share of any additional income from higher than expected take-up rates and sales of additional services that BT could provide through the new infrastructure.

- Interest accrued on a £20 million advance payment made by HIE to BT at the start of the contract.

2015
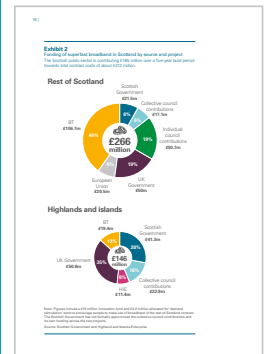
Exhibit 2
(page 16)

Exhibit 3
Funding of rest of Scotland (RoS) and HIE contracts
Total expenditure under the contracts is now expected to reach £442 million.

2015 [1]

BT
£126.1m
31%

Scottish Government
£62.8m
15%

Collective council contribution
£40.0m
10%

Individual council contribution
£50.7m
12%

HIE
£11.4m
3%

UK Government
£100.8m
24%

European Union
£20.5m
5%

£412 million

£412 million

2015-18

Funding changes

EU   Public sector   BT
      £18m   **£20m**

£ million

25
20
15
10
5
0
-5
-10

-£8.5m

-£8.5m

HIE £2.8m
RoS £15.6m

HIE £10.6m
RoS £9.3m

£30 million

+

= £442 million

2018

BT's additional contribution
£20m
5%

BT's original contribution
£126m
29%

Public sector additional income
£10m
2%

£442 million

Original public sector contribution
£286m
65%

The Scottish Government announced its 'Reaching 100 per cent' programme in May 2016. This will see further investment, with an initial £600 million and an 'aligned interventions' programme which has still to be fully costed.

Note: 1. These figures include a £16 million innovation fund and £2.2 million for demand stimulation work to encourage people to make use of superfast broadband in the rest of Scotland contract.
Source: Scottish Government and HIE project documents

14. So far, the Scottish Government and HIE have approved reinvestment of **£57.4 million,** earned through a combination of these mechanisms, for BT to extend roll-out. This means BT will continue to build infrastructure as part of the contract extensions until September 2019.

15. The rest of Scotland contract will reinvest **£26.9 million**. This will extend access to the fibre network to an additional 27,800 premises, five per cent of the original target. It will also improve speeds for some premises which otherwise could not receive 24 Mb/s:

- £15.6 million additional income from higher take-up rates will be used by BT to extend the network at no further cost to the Scottish Government. Take-up is currently 43 per cent, significantly higher than expected.

- £11.3 million is made up of £5 million remaining in an innovation fund and £6.3 million from savings arising from a change in the approach to providing standard broadband (2 Mb/s +). This money was used to build more expensive infrastructure in the last quarter of 2017/18.

Further money from higher than expected take-up rates is currently being agreed with BT and Broadband Delivery UK (BDUK).[6]

16. The HIE contract has **£30.5 million** available to extend access to the fibre network to an additional 32,500 premises, 22 per cent of the original target:

- £25.5 million in savings from lower than expected costs arising from using a different mix of technologies than originally planned.

- £2.2 million additional income from higher take-up rates. Take-up in the HIE area is now 47 per cent compared to an expected 20 per cent.

- £2.8 million from an innovation fund including £0.6 million accrued interest on the advance payment.

The Scottish Government has yet to fully assess the economic impact of the two contracts

17. In 2012, the Scottish Government used consultants to calculate the potential economic impact of the investment in superfast broadband. This analysis predicted that the public sector investment in both areas would directly benefit the economy by £1 billion with a further £2 billion economic benefit by 2028.

18. The Scottish Government has not yet assessed the actual economic benefit of the investment to date. It has commissioned further analysis and plans to publish this later in 2018. It is likely to be difficult to distinguish the economic impact arising from public investment in the broadband network from that of broadband installed by commercial operators. Performing this analysis will be an opportunity to provide a fuller understanding of the social and economic benefits of digital connectivity, helping decision-making about and priorities for future investment.

2015

Superfast
broadband for
Scotland
A progress report
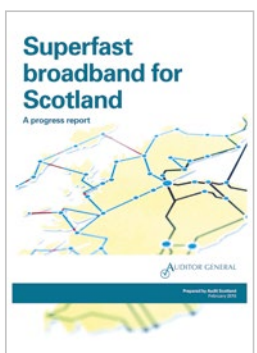
Paragraph 90
(page 37)

The Scottish Government has improved its public reporting

19. We previously recommended that the Scottish Government and HIE further develop how they measure performance and make more information publicly available. The Scottish Government now provides better information through its postcode checker on its website.[7] This gives details on the status of roll-out to individual premises and the expected speeds once connected. The Scottish Government is yet to publish information on unit costs, speeds delivered and levels of take-up.

20. We continue to receive correspondence from individuals and businesses wanting more information about when they may be connected or frustrated at the speeds received not matching expectations. As the Scottish Government looks towards future contracts it is important it considers how best to keep the public informed.

Community Broadband Scotland did not deliver anticipated benefits for rural community broadband projects

21. The Scottish Government set up Community Broadband Scotland (CBS) in 2012 to provide broadband solutions to rural communities not covered by either the two BT contracts or commercial plans. Its main role was to provide financial support and advice to communities. These are some of the most remote and difficult to reach communities which are less attractive to commercial suppliers.

22. CBS was funded by the Scottish Government and administered by HIE. Between 2013 and 2016, the Scottish Government provided CBS with £7.5 million to support rural broadband projects. Up to the end of March 2018, CBS spent £6.4 million:

- £2.3 million directly on projects

- £3.4 million on operating and staff costs

- £0.7 million on consultancy services.

23. Since 2012, CBS has provided funding to 63 projects of which:

- 13 successfully delivered broadband to 1,936 premises (ten per cent of which are able to receive speeds over 30 Mb/s)

- one project received funding and successfully appointed a contractor but was closed when that contractor went into administration

- 13 projects received development funding but did not use their allocated capital funding as there was insufficient interest from suppliers

- one project received development and capital funding and is currently seeking a suitable supplier

- 35 projects received small grants for feasibility studies and community engagement but did not progress further

2015

Superfast broadband for Scotland
A progress report
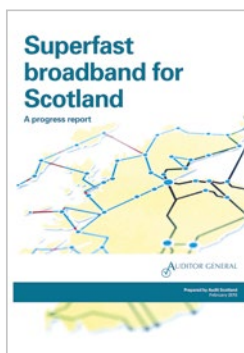
Recommendations
(page 6)

In addition, some 20 projects have successfully delivered broadband to rural communities by securing funding and assistance from sources such as councils and private investment.

24. We reported in 2016 that CBS's role was under review. HIE commissioned a review of CBS at the request of Scottish Ministers in 2017. This highlighted several difficulties which CBS faced, some of which were outside its control, including:

- bureaucratic processes, such as EU state aid rules and public sector procurement requirements

- market failings, due to the difficultly in attracting enough commercial suppliers to compete to deliver broadband to rural communities

- uncertainty, with some rural communities unclear whether the rest of Scotland or HIE contracts, or commercial suppliers would cover their area.

2016

Superfast broadband for Scotland
A progress update
August 2016

(page 13)

25. At the same time, the review found CBS was not effective in communicating with communities and did not possess the in-house expertise in procurement and technology to support communities effectively. This contributed to lengthy delays and failed procurements. We spoke to a sample of community groups who confirmed experiencing similar issues. They commented this has affected their confidence in the ability of the Scottish Government and HIE to deliver broadband to rural communities (Exhibit 4, page 15).

26. Following the review of CBS, the Scottish Government and HIE did not fund any new community projects. Existing projects were given the option of continuing without support or being included in the Scottish Government's 'Reaching 100 per cent' programme (R100) (Part 2). If projects chose to continue they had to be financially sustainable and have infrastructure able to provide speeds over 30 Mb/s. All but one CBS project opted to be included in R100. In January 2018, HIE announced that the CBS team was being reduced from 18 to 5.6 full-time employees and rebranded as the digital communities' team. The team continues to provide support for the existing CBS projects while the R100 procurement process is completed.

27. Planning, procuring and managing a community broadband project requires skills and experience that rural communities do not always have. It also requires significant time commitment from volunteers. We spoke to three community broadband projects to get a better understanding of the challenges they face and the benefits of having access to good broadband speeds. The projects experienced similar issues which we illustrate in Case study 1 (page 16) and Case study 2 (page 17).
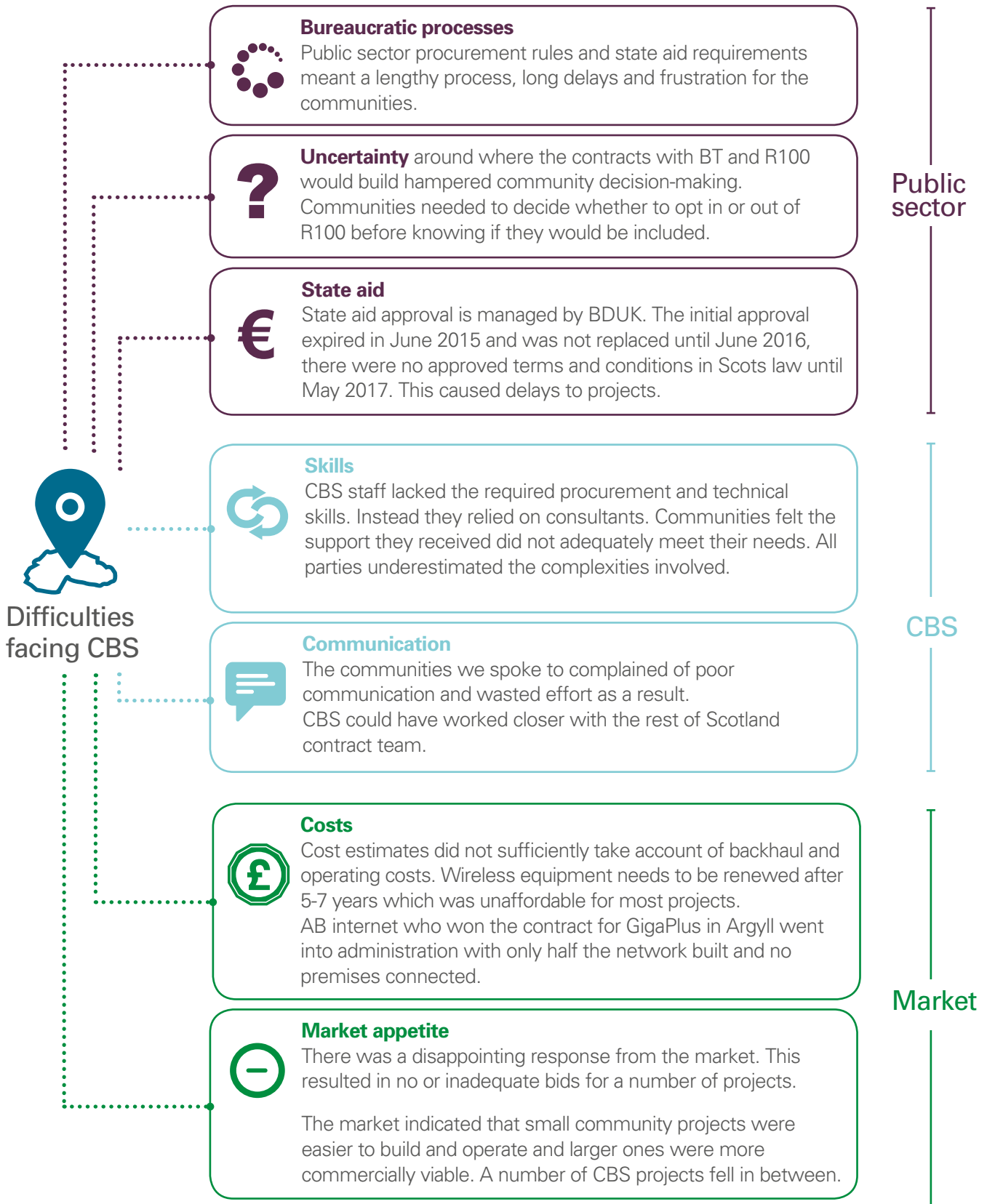
Exhibit 4
The difficulties CBS faced in delivering rural broadband projects
A lack of the required procurement and technical expertise and poor communication with communities contributed to CBS not delivering anticipated benefits.

Difficulties facing CBS

Bureaucratic processes
Public sector procurement rules and state aid requirements meant a lengthy process, long delays and frustration for the communities.

Uncertainty around where the contracts with BT and R100 would build hampered community decision-making. Communities needed to decide whether to opt in or out of R100 before knowing if they would be included.

State aid
State aid approval is managed by BDUK. The initial approval expired in June 2015 and was not replaced until June 2016, there were no approved terms and conditions in Scots law until May 2017. This caused delays to projects.

Public sector

Skills
CBS staff lacked the required procurement and technical skills. Instead they relied on consultants. Communities felt the support they received did not adequately meet their needs. All parties underestimated the complexities involved.

Communication
The communities we spoke to complained of poor communication and wasted effort as a result.
CBS could have worked closer with the rest of Scotland contract team.

CBS

Costs
Cost estimates did not sufficiently take account of backhaul and operating costs. Wireless equipment needs to be renewed after 5-7 years which was unaffordable for most projects.
AB internet who won the contract for GigaPlus in Argyll went into administration with only half the network built and no premises connected.

Market appetite
There was a disappointing response from the market. This resulted in no or inadequate bids for a number of projects.

The market indicated that small community projects were easier to build and operate and larger ones were more commercially viable. A number of CBS projects fell in between.

Market

Source: *Review of Community Broadband Scotland*, ekosgen, 2017 and Audit Scotland discussions with communities

Case study 1

Balquhidder community broadband

- The project is intended to deliver fibre connections to 197 homes and businesses in Balquhidder and Loch Voil, about 13 miles from Callander.

- The project received £6,400 from CBS between 2016 and 2017, £2,000 for community engagement work and £4,400 for legal advice.

- The project carried out two procurement exercises through CBS. It received three bids in the first procurement and seven in the second. The project felt some of these bids were viable but reported both procurements failed because of CBS requirements and a change to a UK Government scheme. The project decided to proceed without further assistance and funding from CBS and says it lost around three years by initially following CBS requirements.

- The project felt that the consultants used by CBS did not have the procurement and technical expertise required to support them.

- The project has partnered with an internet service provider and received funding from Stirling Council and LEADER.[1] It expects to finish within its £430,000 budget.

- Seventy per cent of premises have now signed up and once roll-out is complete will be able to access the internet at speeds of 1 GB/s. Before deployment started, these premises had speeds of 0 Mb/s to 4 Mb/s.

- The project feels that the strong sense of community in Balquhidder is the main reason for its success. Local volunteers have designed and installed the network and have also benefited from having two project directors with significant telecommunication and government experience.

- The project estimates that the roll-out will result in an annual increase in economic activity of £1.1 million and an increase in property values of £7 million in the first year.

- Since the roll-out began the project reports that:

  - a festival at the local hotel could offer Wi-Fi to all festival goers and increase marketing through social media

  - property prices have increased

  - several companies have moved back or decided against moving away.

- While the project opted out of the planned R100 contract area, it must regularly update the R100 team to show that it is on track.

Note: 1. LEADER is part of the Scottish Rural Development Programme 2014-20 which is funded by the EU and the Scottish Government.

Source: Discussions with Balquhidder community broadband

Case study 2
Kinloch Rannoch

- Kinloch Rannoch is a village in rural Perthshire, premises in the area are currently able to get speeds of between 0.5 and 20 Mb/s.

- The community established a project to provide wireless broadband to 200 premises along both sides of Loch Rannoch to Rannoch Station.

- The project approached CBS, surveyed demand in the area and got in touch with some suppliers. It received £195 from CBS for marketing activity but CBS later said no further funding was available.

- The level of engagement required from volunteers was significant, over several months. They felt the process with CBS was lengthy and frustrating and that communication was poor.

- BT plans to build fibre broadband to the village as part of the rest of Scotland contract which will enable speeds of 30 Mb/s. Although this is positive for those upgraded, less than 50 per cent of premises will benefit from faster connections. The remaining properties are separated by large distances making them the least commercially attractive, which affects the business case of a community project. The project feels that its market engagement and demand surveys allowed BT to focus on the more commercially viable premises.

- The community considers that the only option for those premises remaining is to wait for R100 investment, but local residents have little confidence this will reach them.

- The project team spoke of families moving to nearby towns or bigger villages because their children were unable to complete homework that required a good internet connection. Businesses in the area have been affected; some need to drive to Perth, an hour and half away, to complete routine reporting through government websites and others cannot expand because additional staff would further overload their slow broadband.

Source: Discussions with Kinloch Rannoch project team

The average broadband speeds experienced have improved across Scotland but are still slowest in rural areas

28. Ninety-five per cent of premises in Scotland now have access to fibre broadband (paragraph 7) delivered by commercial operators and through the public sector contracts. Although these premises have access, the average speeds experienced are generally less than those modelled to be available (Appendix).

29. Within the contract areas less than half the premises that can access superfast broadband currently do so. In the rest of Scotland contract area 43 per cent of premises have taken up superfast broadband, with 47 per cent of premises in the HIE contract area. Affordability could be a factor because faster broadband speed packages can cost more.

30. As much of Scotland's broadband infrastructure is delivered by the commercial sector rather than the Scottish Government and HIE contracts, we used data provided from ThinkBroadband to assess the typical speeds premises across Scotland experience. The ThinkBroadband website allows people to test the upload and download speed of their internet connection. ThinkBroadband then reports an average of all tests performed.[8] Reported speeds are likely to be lower than reported elsewhere because people who are unhappy with their speeds are more likely to test them.

31. Our analysis shows that all council areas have seen their average speeds increase since our 2016 report (Exhibit 5). Premises in Eilean Siar had the biggest increase, from an average of 12 Mb/s to 23 Mb/s. In just under half of Scottish council areas, the majority of which are rural, the average speeds experienced are below 24 Mb/s.

Exhibit 5

Average broadband speeds experienced by local authority area
Speed tests show that average broadband speeds experienced across Scotland have improved since 2016.
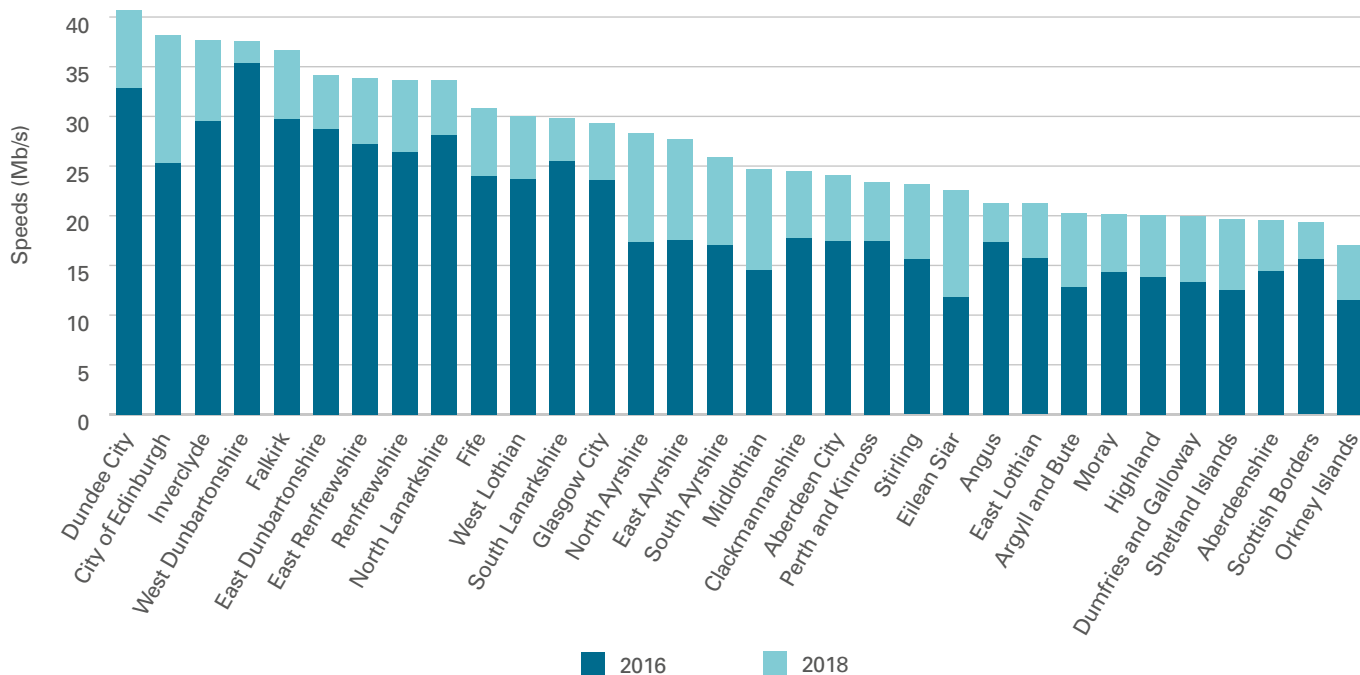
Note: The ThinkBroadband website allows the public to enter their postcode into a tool which calculates the upload and download speed of their internet connection. It is the most up-to-date data available, but it is likely to be lower than other sources as people who are unhappy with their speeds are more likely to test them. Average speeds experienced are generally less than those modelled to be available. This is due to various factors including the package people select from their internet service provider.

Source: ThinkBroadband speed data, April to June 2018

32. In November 2015, the UK Government announced a universal service obligation (USO). This will ensure that anybody can request an internet connection with speeds of at least 10 Mb/s, although this will be subject to a cost cap.[9] In August 2016, we reported that 14 per cent of premises in Scotland could not receive 10 Mb/s with most of these being in rural areas. By January 2018, five per cent of premises still did not have access to at least this speed.[10] The biggest improvement was in Eilean Siar where the percentage of premises not able to receive 10 Mb/s dropped from 54 per cent to 17 per cent (Exhibit 6). However, 25 per cent of premises in rural areas across Scotland are unable to receive speeds of at least 10 Mb/s.[11]

33. Premises that are currently unable to access speeds of 2 Mb/s or above can also apply for £350 towards the cost of installing basic broadband through the Better Broadband scheme which the Scottish Government administers using UK Government funding. At the end of March 2018, 3,520 premises had applied to the scheme and 1,440 had used the funding allocated to them.

34. The Scottish Government considers that to take advantage of the economic, educational and social benefits associated with superfast broadband, it is important to further improve speeds in rural areas. We look at the Scottish Government's next steps in enhancing speeds in rural areas in (Part 2).
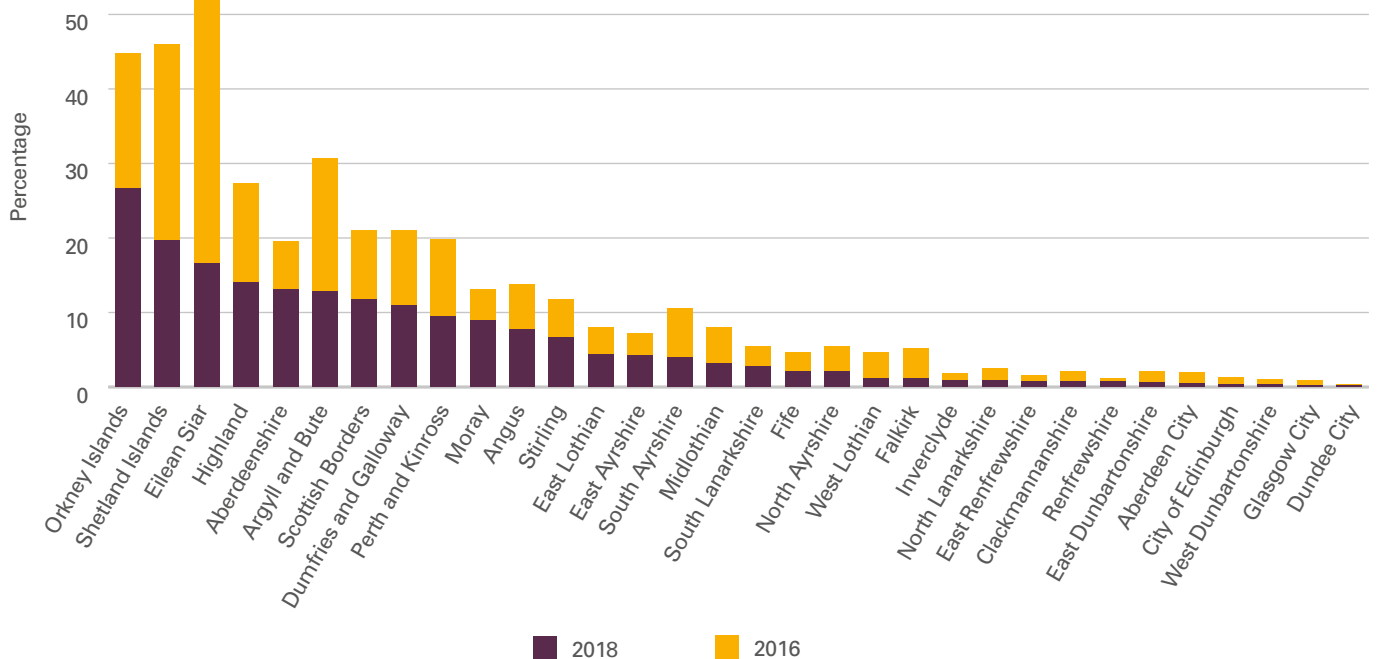
2016

Superfast broadband for Scotland
A progress update
August 2016

(page 11)

Exhibit 6
The percentage of premises that cannot receive speeds of at least 10 Mb/s by local authority area
Fewer premises are now unable to receive speeds of at least 10 Mb/s compared to 2016.

Note: ThinkBroadband's model makes assumptions about speeds the infrastructure it knows is in place can deliver by estimating the length of copper connections to premises within a postcode. It checks this regularly against what internet service providers are offering.

Source: ThinkBroadband modelled data, August 2018

Part 2

The next steps

The Scottish Government has committed to deliver superfast broadband to the whole of Scotland

35. The Scottish Government announced its 'Reaching for 100 per cent' (R100) programme in May 2016 to deliver its commitment that every home and business in Scotland will have access to superfast broadband by the end of 2021. This is a key element of its vision for a world-class digital infrastructure. As part of this, it has changed its definition of superfast broadband from speeds greater than 24 Mb/s to greater than 30 Mb/s. This is consistent with Ofcom's and the EU's definition of superfast.

36. The Scottish Government currently estimates that around 376,000 premises in Scotland cannot currently access speeds of 30 Mb/s (Exhibit 7, page 21). The two contracts with BT (Part 1) will reduce this by around 76,000 premises and the commercial sector is expected to provide superfast broadband to 89,000 of these premises within the next three years. This leaves 211,000 premises where further public-sector investment may be required.

The Scottish Government will initially invest £600 million in the R100 programme

37. In December 2017, the Scottish Government announced an initial investment of £600 million to extend superfast broadband coverage. This consists of £579 million from the Scottish Government and £21 million from the UK Government. This investment is aimed at prioritising superfast fibre connections to as many as possible of the estimated 147,000 rural premises not currently receiving at least 24 Mb/s (Exhibit 7).

38. This leaves an estimated 64,000 premises not included in this initial investment. When deciding the scope, the Scottish Government excluded:

- 30,000 premises in urban areas

- 34,000 premises in rural areas that are currently able to access speeds between 24 Mb/s and 30 Mb/s.

39. The Scottish Government expects these premises to be picked up by commercial plans (in urban areas) and through a scheme it is calling aligned interventions (paragraphs 45–48). This will require careful monitoring and prioritisation to ensure its investment achieves its commitment to reach all remaining premises by 2021. The Scottish Government has not yet published timescales and full details of how and when it intends to extend coverage to those people yet to have access to superfast speeds.
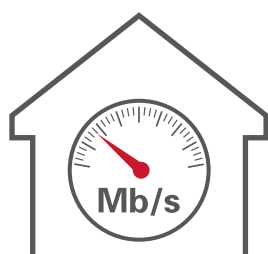
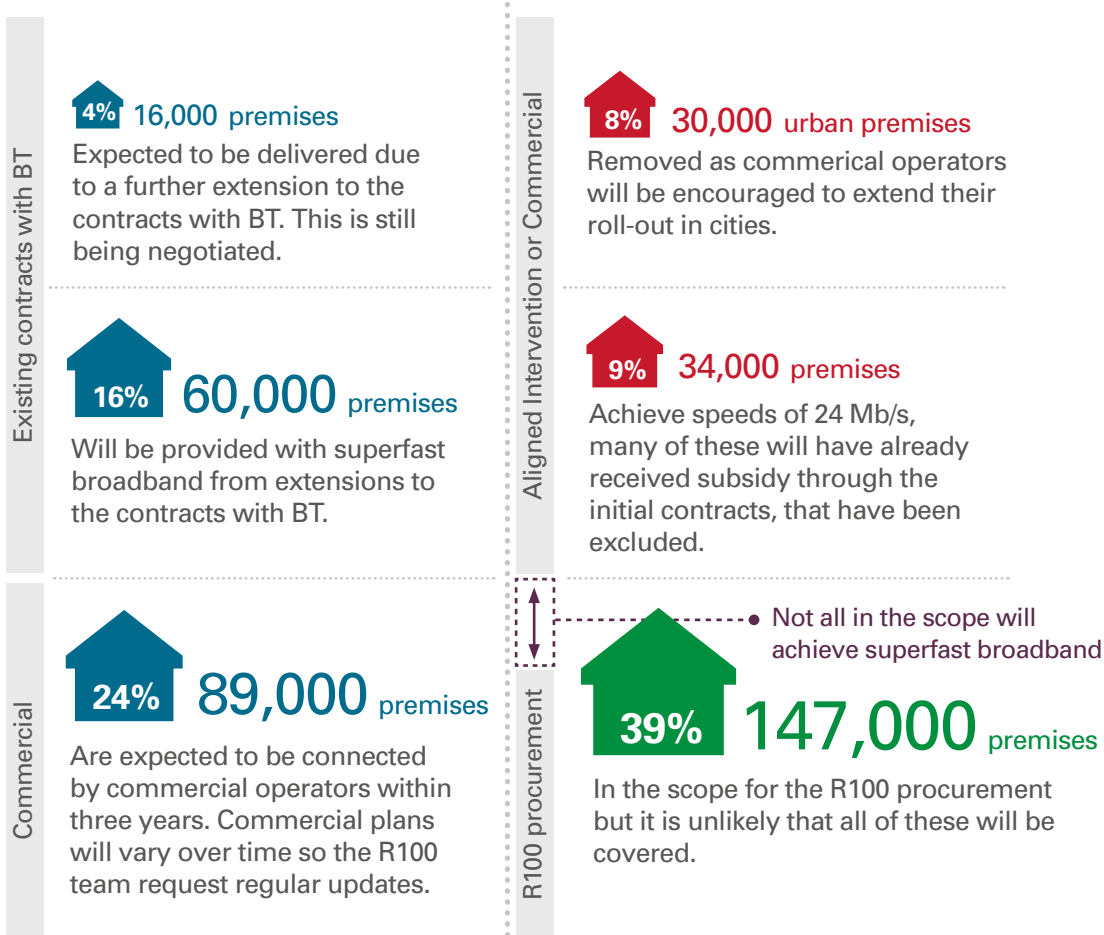211,000 premises may require further public sector investment

Exhibit 7

Premises which currently cannot receive superfast broadband

Around 211,000 premises may require public sector investment before they can receive superfast broadband speeds of 30 Mb/s.

376,000 − **165,000** = **211,000**

premises without superfast broadband

expected to be connected within three years

may require further public sector investment

Existing contracts with BT

4% 16,000 premises
Expected to be delivered due to a further extension to the contracts with BT. This is still being negotiated.

16% 60,000 premises
Will be provided with superfast broadband from extensions to the contracts with BT.

Commercial

24% 89,000 premises
Are expected to be connected by commercial operators within three years. Commercial plans will vary over time so the R100 team request regular updates.

Aligned Intervention or Commercial

8% 30,000 urban premises
Removed as commerical operators will be encouraged to extend their roll-out in cities.

9% 34,000 premises
Achieve speeds of 24 Mb/s, many of these will have already received subsidy through the initial contracts, that have been excluded.

R100 procurement

Not all in the scope will achieve superfast broadband

39% 147,000 premises
In the scope for the R100 procurement but it is unlikely that all of these will be covered.

Note: The figures in this exhibit will change as the R100 procurement progresses and as commercial plans and further reinvestment from the original contracts becomes clearer.

Source: R100 Initial descriptive document and discussions with the Scottish Government

40. The Scottish Government launched the R100 procurement exercise in December 2017. To encourage bids from as many contractors as possible, it decided to split the procurement into three lots:

- The North – Highlands and Islands, Angus, Aberdeen and Dundee with a contract value of £384 million and around 84,000 eligible premises.

- Central – Central Scotland and Fife with a contract value of £83 million and around 42,000 eligible premises.

- South – The Scottish Borders and Dumfries and Galloway with a contract value of £133 million and around 21,000 eligible premises.

41. To encourage the successful contractors to build fibre in the most remote areas of Scotland the Scottish Government has specified:

- 11 mandated areas, all in the North lot, where 25 per cent of premises must be able to get speeds of at least 100 Mb/s.

- 36 weighted areas, two in the South and the rest in the North.

42. The procurement exercise requires bidders to set out how many of the in-scope premises they could connect, how they would do this, and at what cost. The Scottish Government will not have an exact picture of how many and which premises its £600 million subsidy will cover until final bids are received, expected in January 2019.

43. Assuming that bidders can connect all 147,000 premises, the average subsidy to connect each premise for this level of investment is £4,000. This is more than double the cap on how much BT could spend to connect each premise within the terms of the original two contracts. Within this, the range of costs to connect the remaining premises could be significant. Many of the premises still to be connected are in the most remote and challenging parts of the country and connection costs are likely to be high. At the same time, other premises, closer to centres of population and existing infrastructure, are likely to be cheaper to connect.

The contracts for R100 will be awarded in early 2019

44. The Scottish Government anticipates it will award the contracts in March 2019. This is slightly later than originally planned to allow bidders more time to prepare their bids. The Scottish Government believes this will ensure it does not lose potential bidders from the process. The Scottish Government will need to ensure it provides regular updates on progress, so stakeholders and communities fully understand the timescales and what premises are included.

Further investment in addition to the £600 million may be necessary to complete the R100 programme

45. The Scottish Government recognises that a full fibre connection to all premises is unlikely to be achievable on cost grounds and within current timescales. It expects the initial R100 procurement to extend superfast fibre access to most of the 147,000 premises, but it is unlikely to reach them all. The Scottish Government is considering its options under various scenarios such as using different technologies to extend access. This could involve laying further fibre or could mean using mobile, wireless or satellite technologies. These are cheaper to install but more expensive for the consumer and less reliable than fibre.

2015

Superfast broadband for Scotland
A progress report

AUDITOR GENERAL

Prepared by Audit Scotland
February 2015
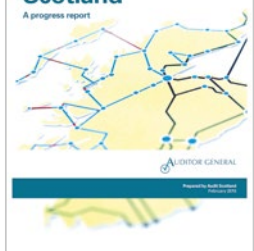
Paragraph 58
(page 25)

46. The Scottish Government is planning for this through its aligned interventions scheme which is likely to involve a voucher scheme, where households can apply for vouchers to help fund access to superfast broadband. The eventual size and cost of this is dependent on a number of variables including the number of premises and the extent to which it can be integrated with other broadband schemes. It has established a team within the R100 programme to develop the aligned interventions scheme.

47. The Scottish Government will need to consider several issues when designing this scheme, including:

- what type of technologies will be allowed

- whether there should be a cost cap or threshold attached

- how communities could pool their vouchers to increase their buying power

- how the scheme will interact with the R100 roll-out to ensure interventions are prioritised appropriately to meet its 2021 timescales.

48. The exact number of premises requiring aligned interventions, their location, and the potential cost involved will not become clear until later in the current procurement process. It will be important for the Scottish Government to clearly set out what premises are covered by which programme (original contracts, R100, aligned intervention or, commercial) at the earliest opportunity. This will allow consumers and communities to fully understand the process and potential timescales.

It will be difficult for the Scottish Government to deliver its 100 per cent target by December 2021

49. The R100 programme is complex, involving substantial investment and coordinating activities. It will be challenging for the Scottish Government to deliver within the timescales for several reasons:

- Contracts will be awarded in early 2019 leaving less than three years for the Scottish Government to deliver its commitments to the most complex premises.

- Detailed arrangements for the aligned intervention scheme have still to be finalised, with a project manager only coming into post in summer 2018. Depending on how the scheme operates, it is likely that the process to apply and provide a solution will be lengthy.

50. The Scottish Government will need to ensure it applies the knowledge and experience from the original BT contracts and CBS programme, as well as other large government programmes to successfully deliver its R100 commitment. The recommendation in our 2015 report about the need to ensure a sufficient number of staff with the required skills are in place to scrutinise progress and check work done remain valid.

2015

Superfast broadband for Scotland
A progress report

Recommendations
(page 6)

The technology and market for delivering a world-class infrastructure are complex and constantly evolving

51. Since we last reported in August 2016 the Scottish Futures Trust (SFT) has continued to work with the Scottish Government to deliver its vision to deliver a world-class infrastructure.[12] The SFT defines a world-class digital nation as 'meeting the unique and individual requirements of everyone, so that every person, every community and every business in Scotland can be digitally included with the opportunity to access and use the technology they require'.[13]

52. The technology available to improve digital connectivity is constantly evolving. Keeping up with the pace of change is challenging and the Scottish Government recognises that the infrastructure put in place today must be able to cope with future demands and new technologies. The Scottish Government believes that extending fibre infrastructure as far as possible is the best way to futureproof digital infrastructure.[14] For example, 5G is the next generation of mobile connection providing speeds of 1 Gb/s to mobile phones. It is regarded as the cornerstone of technology such as self-driving cars and will require multiple masts each with a fibre broadband connection.

53. There are more commercial providers, and digital infrastructure programmes than ever before. Virgin and BT are investing in their superfast network while new companies such as CityFibre and Gigaclear have entered the market. Alongside this, there is a crowded public-sector investment programme. These include the 10 Mb/s universal service obligation of the UK Government and investment in the 4G and 5G networks by the UK and Scottish governments.

54. The Scottish Government and SFT will have to monitor these activities to ensure they are coordinated and do not overlap. Exhibit 8 (page 25) provides a high-level summary of some of the existing and planned activity in this area to demonstrate the complexity.

The Scottish Government is yet to publish an overall strategy to monitor and map out all activity

55. The activity in Exhibit 8 is constantly evolving and will contribute to the Scottish Government's vision for a world-class digital infrastructure. The Scottish Government does not have powers to coordinate commercial activities. However, its R100 programme team continues to develop its relationship with commercial suppliers and monitors activity to ensure there is no potential overlap with its roll-out plans and that investment is properly planned and directed. The Scottish Government's Digital Infrastructure Board (DIB) oversees its investment in this area. It comprises officials from the Scottish Government, SFT, HIE, Scottish Enterprise, COSLA, SOLACE and three councils.[15]

56. There is currently no overall strategy mapping out existing and future activities. It will be important for the DIB to develop a flexible and coordinated strategy to deliver the Scottish Government's world-class vision. In particular, the Scottish Government expressed in 2012 its vision to be a world-class digital nation by 2020. Given that R100 is a key part of realising that vision and it is not targeted to be delivered until December 2021, there is a need to reappraise the timetable for achieving world class. We would expect the DIB to have a plan in place by summer 2019.

2016

Superfast broadband for Scotland
A progress update

There is still much to be done if the Scottish Government is to achieve its vision of world-class infrastructure
(page 14)

Exhibit 8
Some of the current and planned digital infrastructure activity
Both the private and public sectors are actively involved in providing digital infrastructure.

Private sector

Virgin Project Lightning
- 360,000 additional premises in Scotland
- £3 billion cost across the UK

CityFibre
- FTTP to one million homes in UK by 2021, four million by 2025
- Presence in Aberdeen, Ayr, Edinburgh, Dundee, Stirling and Glasgow

Gigaclear
- Rural FTTP provider who has won seven BDUK contracts in England

Openreach Fibre first
- FTTP to three million premises across the UK by 2020 and to ten million by 2025
- Initial build to start in nine cities in 2018, Edinburgh is the only Scottish city

Hyperoptic
- FTTP provider to 350,000 premises in 28 UK cities including Glasgow and Edinburgh
- Received £100 million investment from European banks in 2017 towards connecting two million UK premises by 2022 and five million by 2025

UK Government

City Deals
- Aberdeen – £11.5 million, considering public sector connectivity
- Stirling and Clackmannanshire City deal – £4 million for business support
- The Borderlands regional deal and Ayrshire and Moray's growth accelerator deals include telecoms infrastructure investment in their business case
- Highland – £20 million, includes city centre Wi-Fi in Inverness

Full Fibre fund
Highland – £4 million to connect public sector sites in Fort William, Inverness, Thurso and Wick

Universal Service Obligation
- Everybody in the UK can request a connection of 10 Mb/s
- Cost cap of £3,400
- Currently being designed by Ofcom

Better Broadband scheme
- Homes and businesses that cannot access 2 Mb/s can apply for vouchers through the scheme
- Cost cap of £350

Gigabit broadband voucher scheme
- £67 million towards the installation cost of a gigabit capable connection for homes and businesses
- Businesses can claim a voucher for £3,000 while residents must group together, each premises can apply for £500

Future Telecoms Infrastructure review
- UK Government's ambition to provide full fibre infrastructure to all premises in the UK by 2033

Emergency service communication programme
- A 4G network designed for use by the emergency services

Scottish Government

Contracts with BT
- 95 per cent of premises in Scotland have access to fibre network
- Mostly rural but some urban areas
- £442 million cost to Scottish Government, HIE, EU, councils and BT

R100 initial procurement
£600 million through three contracts to connect as many as possible of those premises that cannot get superfast broadband

R100 aligned interventions
Under development and likely to include a voucher scheme for those not covered by the initial R100 procurement

SFT world class
- International connectivity
- 5G strategy
- Data centres

Scottish Wide Area Network (SWAN)
- Public sector network with 52 member organisations
- £12 million spent on installation to date

4G infill project
- £25 million project to build mobile infrastructure in 60-70 not spots
- Includes £10 million of EU funding
- This will include fibre to the mast as far as possible

KEY

⊕ Urban   ◊ Rural   ⚙ All

Source: Audit Scotland

57. Digital technology is an important area for the public sector as it can transform the way public sector organisations deliver services. Building on our previous audits on Managing ICT contracts ⬔ and our *Principles for a digital future* ⬇ guide, we have a number of audits in our future work programme looking at digital strategies and programmes, including looking at the Scottish Government's progress towards its world-class vision.[16]

Endnotes

1   The number of premises is based on the 2012 Open Market Review.

2   Ofcom collects estimated upload and download speeds and the type of technology by premise from ten service providers, it then matches this information against ordnance survey postcode data to give coverage statistics. The ThinkBroadband website allows the public to enter their postcode into a tool which calculates the upload and download speed of their internet connection. The speed data is based on an average of these results. The coverage statistics are based on ThinkBroadband's model which makes assumptions about speeds the infrastructure it knows is in place can deliver. This is checked regularly against what internet service providers are offering.

3   For the original contracts the Scottish Government classified superfast as speeds greater than 24 Mb/s, it has now updated its definition to speeds greater than 30 Mb/s in line with Ofcom and the EU.

4   https://www.scotlandsuperfast.com/latest-stories-and-events/stories/scotland-reaches-95-fibre-coverage/

5   Work for the HIE contract is due to end September 2019. Work in the rest of Scotland area is due to end in December 2018 but may continue beyond this depending on if it receives further money for higher than expected take-up.

6   BDUK is a department within the Department for Culture Media and Sport in the UK Government responsible for the delivery of superfast broadband across the UK. *See paragraphs 39 to 40 in our 2015 report*⊕.

7   https://www.scotlandsuperfast.com/yourstreet

8   https://labs.thinkbroadband.com/local/scotland

9   Ofcom is currently developing the USO on behalf of the UK Government.

10 Connected nations update data dashboard: Spring 2018, Ofcom, April 2018.

11 Ibid.

12 The Scottish Futures Trust is an infrastructure delivery company, wholly owned by the Scottish Government. Its aim is to improve the efficiency and effectiveness of public sector infrastructure investment.

13 *Taking the connected highway*, Scottish Futures Trust, June 2016.

14 *A digital strategy for Scotland*, Scottish Government, 2017.

15 Glasgow City, Dumfries and Galloway and Eilean Siar.
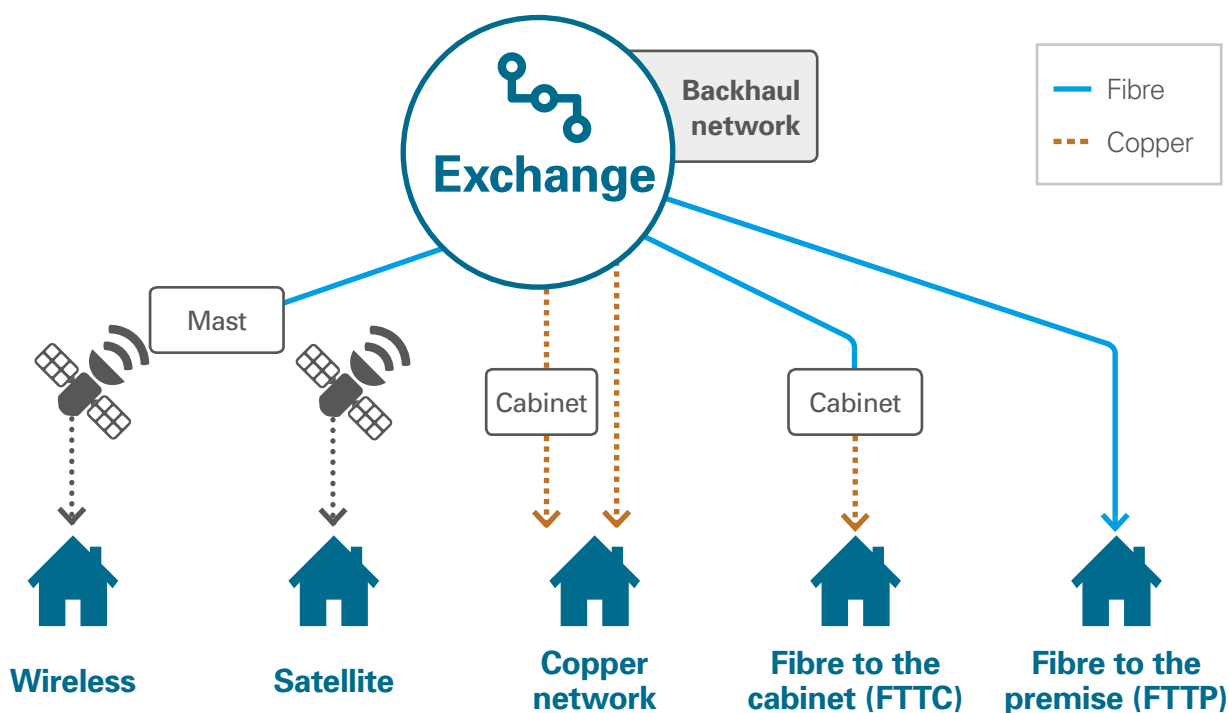
16 Audit Scotland work programme ⬉.

Appendix

How superfast broadband reaches users

The Scottish Government and HIE are investing in superfast broadband across Scotland to bridge the gap between what commercial operators will provide and its policy ambition for a world-class digital infrastructure.

Broadband can be provided through different connections and technologies. This determines the speed that premises can receive.

Through its contracts with the Scottish Government and HIE BT has replaced parts of the copper network with FTTC and FTTP. As the roll-out moves to more remote areas this becomes more expensive.

The Scottish Government's 'Reaching 100 per cent' programme aims to extend fibre further. In the most difficult regions alternative solutions such as wireless and satellite may be needed.

Exchange

Backhaul network

Mast

Cabinet

Cabinet

Fibre
Copper

	Wireless	Satellite	Copper network	Fibre to the cabinet (FTTC)	Fibre to the premise (FTTP)
Speed[1]	Up to 100 Mb/s	2-30 Mb/s	8 to 24 Mb/s	Up to 100 Mb/s	Up to 1 Gb/s
Description	Broadband provided through radio waves from a mast connected to the fibre network.	Internet provided through satellite technology for the most remote areas.	Broadband provided through the existing telephone network. Speeds vary depending on technology in the exchange.	Fibre optic cables to the cabinet and then existing copper lines to the home	Fibre optic cables all the way to the premises.
Pros	Cheaper option for remote areas as less engineering work required.	Cheaper to provide than fibre as little or no engineering work is needed.	In some areas technology is able to provide good speeds to those close to the cabinet. Uses the existing network so limited additional cost.	Some of the benefits of fibre optics but with less cost. It relies on the existing network for connection to the premises.	Very fast speeds for multiple users doing a number of things at once on the internet.
Cons	Will still require access to the fibre infrastructure. Equipment needs to be renewed every 5-7 years.	Speeds reduce with multiple users and poor weather. Delays in the connections cause problems for gaming and Skype. More expensive for customers.	Copper lines lose speed quickly with distance from the exchange. Long lines are significantly slower than 24 Mb/s. The number of people online and the condition of the copper can all reduce speeds.	Speeds reliant on the distance, quality of copper connection and number of people online.	Most expensive option as it requires more engineering work to lay cables.

Note: 1. https://www.thinkbroadband.com/how-broadband-works

What can you do with superfast broadband?

FTTC and FTTP allows access to faster broadband speeds which means you can download or stream music and movies more easily. The upload speeds will also increase which is important for video calling and business use. Fibre connections are often more reliable than copper or other technologies so there will be less drop offs in your internet connection.

	10 Mb/s	30 Mb/s (superfast)	300 Mb/s (ultrafast)	1 Gbit/s
Streaming music	Yes	Yes	Yes	Yes
Downloading an album	1-2 minutes	30-60 seconds	Less than 10 seconds	Less than 5 seconds
Streaming an HD movie	Yes	Yes	Yes	Yes
Downloading an HD movie	1-1.5 hours	30 minutes	Less than 5 minutes	Less than 2 minutes

Source: Ofcom connected nations

Factors which affect your broadband speed

Outside your premises:

- The length of copper between the premises and the cabinet or exchange.

- The quality of wiring to your premises.

- The number of people online at the same time.

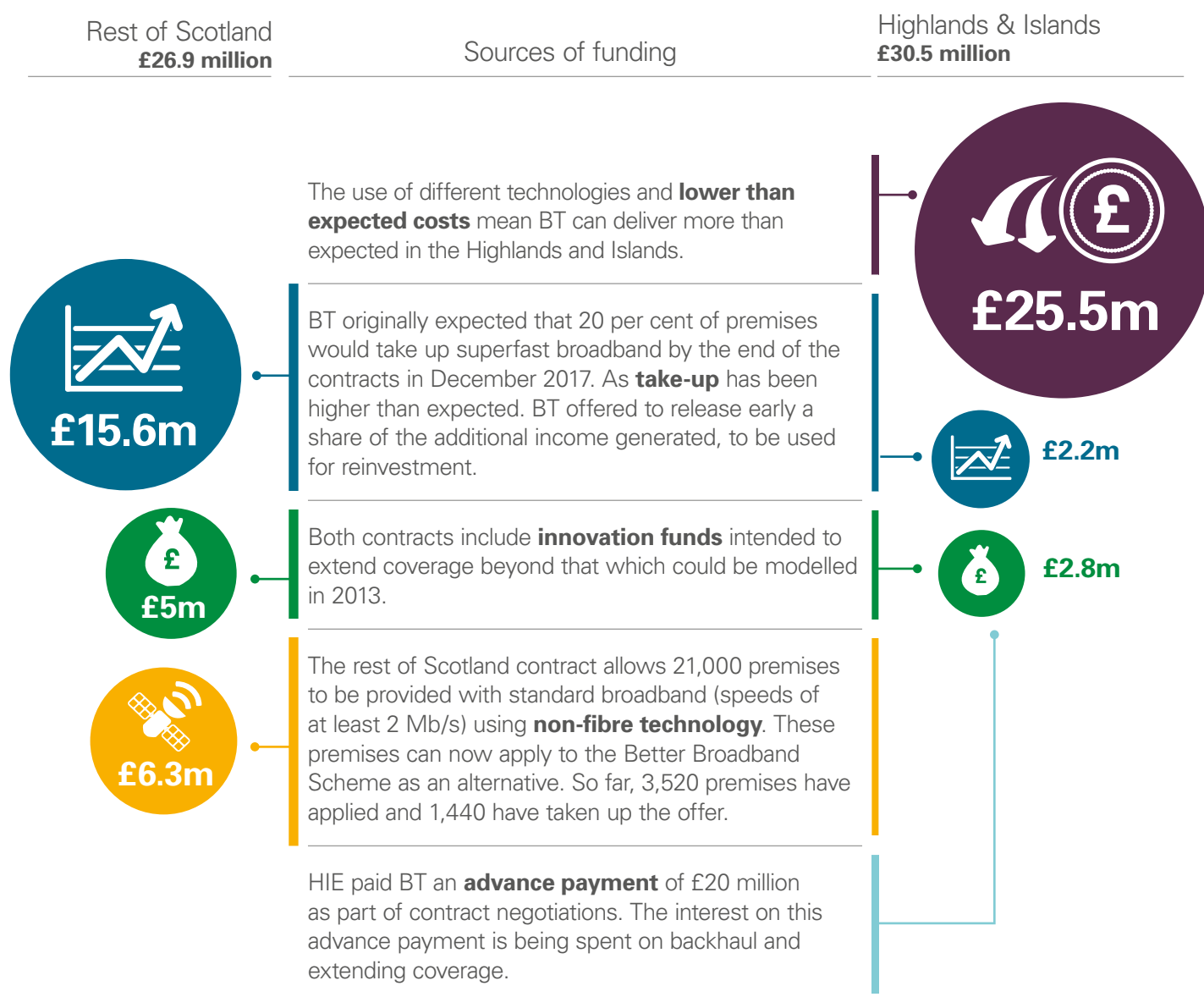- Whether your connection is via Wi-Fi or direct to your computer.

Inside your premises:

- The internet package bought from your internet service provider (ISP).

- The quality of your internal wiring and router.

- The number of neighbouring premises online at the same time.

£57.4 million is available from higher than expected take up and lower than expected costs and is being used to increase coverage

More detail can be found in paragraphs 14–16.

| Rest of Scotland **£26.9 million** | Sources of funding | Highlands & Islands **£30.5 million** |

The use of different technologies and **lower than expected costs** mean BT can deliver more than expected in the Highlands and Islands.

£25.5m

£15.6m

BT originally expected that 20 per cent of premises would take up superfast broadband by the end of the contracts in December 2017. As **take-up** has been higher than expected. BT offered to release early a share of the additional income generated, to be used for reinvestment.

£2.2m

£5m

Both contracts include **innovation funds** intended to extend coverage beyond that which could be modelled in 2013.

£2.8m

£6.3m

The rest of Scotland contract allows 21,000 premises to be provided with standard broadband (speeds of at least 2 Mb/s) using **non-fibre technology**. These premises can now apply to the Better Broadband Scheme as an alternative. So far, 3,520 premises have applied and 1,440 have taken up the offer.

HIE paid BT an **advance payment** of £20 million as part of contract negotiations. The interest on this advance payment is being spent on backhaul and extending coverage.

Superfast broadband for Scotland

Further progress update

This report is available in PDF and RTF formats, along with a podcast summary at:
www.audit-scotland.gov.uk

If you require this publication in an alternative format and/or language, please contact us to discuss your needs: 0131 625 1500
or **info@audit-scotland.gov.uk**

For the latest news, reports and updates, follow us on:

AUDIT SCOTLAND

RECYCLED
Paper made from recycled material
FSC® C023105

This publication is printed on 100% recycled, uncoated paper