WHOLESALE BROADBAND ACCESS SERVICES IN JERSEY: PRICE REVIEW

A report for the JCRA

Non-confidential version – redacted for publication

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EXECUTIVE SUMMARY

The JCRA has engaged Frontier Economics to support it in its review of the pricing of JT's wholesale broadband access services in Jersey. A report by Frontier was issued alongside the JCRA's Draft Decision on this review, which set out the underlying analysis supporting the proposals in that Decision. This report is an updated version of that report, which outlines the updated set of analysis that informs the JCRA's Final Decision. The focus on this report is to explain this analysis - the responses to the JCRA's Consultation and the JCRA's treatment of them is set out in the Final Decision, and only passing comment is made to it in this document.

Fixed broadband services in Jersey are predominantly provided over fibre-based technology. The incumbent JT started investing in Fibre-to-the-Premises (FTTP) infrastructure in 2012 and by 2018 achieved island-wide coverage. After completing its FTTP roll-out, JT has migrated its retail and wholesale customers to fibre and decommissioned its copper network.

In addition to JT, there are Other Licensed Operators (OLOs): Sure Jersey and Homenet who provide retail broadband services using JT's FTTP network[1]. We understand that Airtel – currently a mobile only operator – is planning to launch retail broadband services using wholesale access to JT's network in the next few months.

An overarching objective for this review, which flows from the Jersey Government policy, is to ensure the benefits of the JT fibre network are maximised though effective service-based competition, i.e. access seekers are able to provide differentiated retail services to consumers at a competitive price.

Based on the above overarching objective and wider considerations, the key objectives of this wholesale price review are:

- **Enabling retail competition in the market**, by ensuring wholesale products allow access seekers to compete effectively and to provide a choice of retail products for consumers;
- **Achieving cost based prices,** ensuring that wholesale and hence retail prices are not excessive while ensuring that JT is able to recover its efficiently incurred costs and to earn an appropriate rate of return on its investment; and
- **Maximising take-up** of broadband services on JT's FTTP network.

Reflecting these objectives, the overall scope of the work is to:

1) Assess the appropriate set of regulated wholesale broadband products to be offered by JT to access seekers;
2) Assess the appropriate regulatory cost-orientated pricing regime for the wholesale products; and

[1] Homenet also provides services using its WiMax and FTTP networks, although its FTTP network has limited coverage.

3) Provide a recommendation on the appropriate level of prices for wholesale broadband products, using an appropriate cost model where required.

The appropriate set of wholesale broadband products to price regulate

There are two types of wholesale access products currently provided in the market:

- Wholesale broadband products with pre-defined download speeds (500 Mb/s and 1 Gb/s) and pre-defined contention ratios. Previously, lower speed products were available, with download speeds of 50 Mb/s, 100 Mb/s and 250 Mb/s. However, these were gradually replaced with the current higher-speed products.
- The recently introduced bitstream product, which allows OLOs to offer differentiated retail products as they can self-manage their customers' needs in relation to speed (up to 1 Gb/s), contention and quality of service.

As part of this review, we needed to establish what wholesale products need to be price regulated to enable OLOs to provide differentiated broadband services to their customers.

Based on OLO's responses to information requests we conclude that demand is focused on bitstream and there is potential demand for lower speed broadband services in Jersey. This demand can be served using the existing bitstream product as it is sufficiently flexible and allows OLOs to determine the speed of retail broadband services they want to offer to their customers. This finding was supported by the responses of OLOs and JT to the JCRA's Consultation on its Draft Decision. Therefore, the JCRA has chosen to only price regulate the bitstream product, and do require JT to introduce any additional wholesale products with pre-defined speeds.

Our proposed regulatory approach

In principle, there are two potential approaches to regulating the price of access to JT's FTTP network:

- **Cost orientation**. Under this approach, wholesale prices are set on the basis of the cost of providing the service. It ensures that operators can cover costs that are efficiently incurred and receive an appropriate return on their investment.
- **Ex-ante margin squeeze test (MSQ).** Under this approach, the wholesale price is not regulated directly. However, there is an assessment whether access seekers can profitably replicate the retail broadband offers of the SMP operator, given the level of wholesale prices charged by the SMP operator.

We consider that, given the circumstances in the fixed broadband market in Jersey, it is appropriate for the JCRA to set wholesale access prices based on cost-orientation. This is due to the following considerations:

- **The Jersey Government's objective is to maximise the use of JT's network rather than to promote infrastructure-based competition** – as discussed earlier, the Jersey Government's objective is to promote service-based rather than infrastructure-based competition. In light of that, it is

appropriate to set regulated prices in a way that allows JT to recover its efficiently incurred costs and to earn an appropriate rate of return, rather than to incentivise access seekers to invest in their own fibre networks. This is best achieved through setting cost-oriented wholesale prices.

- **The lack of external price constraints** – there are no alternative fixed broadband products in Jersey (e.g. alternative fibre or cable networks) that would act as an effective constraint on JT's pricing of its fibre products.[2]
- **The demand and the cost of JT's network are predictable** – JT has already achieved island-wide coverage and its FTTP network is fully established. Demand for its network has been broadly stable since all JT's customers (both retail and wholesale) have been migrated to fibre. Moreover, as the network is already built and has been operational for several years, build costs are known and future maintenance costs are predictable.

In practice, wholesale line rental (WLR) is also required to provide a broadband service using the bitstream product. As such, cost-orientated pricing will be applied to the total wholesale charge, or "maximum price", which is the WLR charge plus the additional charge for the bitstream product (the "bitstream price"). This means that the total price paid to JT to provide a broadband service using the bitstream product is reflective of JT's cost of providing that service.

Further, we discuss the most appropriate approach to implementing cost-orientation. We conclude that a 'top-down' approach is more appropriate than a 'bottom-up' approach, given the market characteristics (JT's FTTP network is well-established) and given that a top-down model requires fewer resources to implement so is proportionate to the small size of the jurisdiction.

We propose the JCRA set cost-oriented wholesale prices for a five year period. Using a five year charge control period is consistent with EC recommendations and wider best practice. The JCRA plan to introduce the charge control from October 2021, meaning the five-year period equates to October 2021 to September 2026

Proposed wholesale prices for the bitstream "maximum price"

We consider two potential approaches to structuring the cost-oriented maximum price for wholesale bitstream:

- A fixed fee – this approach is similar to the approach currently implemented in Jersey. It implies that OLOs pay a uniform price per customer irrespective of their customers' data usage or the speed of broadband services they are offered;
- A 'two-part' tariff – this is an alternative approach. Under this approach, the wholesale charge consists of a fixed fee (which is the same across all

[2] If JT's wholesale prices are set based on cost-orientation, there is no need to further impose an ex-ante margin squeeze obligation. This is because the risk of a margin squeeze under cost-oriented wholesale pricing is low. While the ex-ante margin squeeze is not needed going forward, the JCRA would continue to have the power under competition law to investigate whether JT engages in margin squeeze on an ex-post basis.

customers) and a variable component based on customers' busy hour (BH) usage.

The second approach implies that OLOs would face different wholesale charges depending on the speed they offer to their retail customers: lower charges for lower-speed products (as lower speeds would imply lower BH usage) and higher charges for higher speed products. This approach is considered as it could better support retail differentiation by OLOs.

The two approaches are mutually exclusive, and each has its strengths and weaknesses (these are discussed in detail in the main body of the report). Both approaches were consulted on as part of the JCRA's consultation process. Taking into account responses to its Consultation, the JCRA has decided that the appropriate charging approach for the maximum price is a fixed fee.

JT's maximum price for bitstream under the "fixed fee" pricing structure

The bitstream price is currently set at £20.15 per month (excluding GST), with the price for wholesale line rental (WLR) currently set at £11.10 per month. Therefore, the total wholesale charge, or "maximum price" required to provide a broadband service to retail customers using the bitstream product is currently £31.25 per month.

In modelling the maximum price, we retain the split between the WLR and the additional bitstream price in order to maintain the consistency with the existing pricing structure. Assuming that the WLR charge remains at the current £11.10/month price over the price control period, the bitstream prices and the "maximum price" (WLR + bitstream price) for the period 2021/22-2025/26 are presented in Figure 1 below.

Figure 1 Estimated cost-based "maximum price" for JT's Bitstream service: 2021/22 – 2025/26[3]

		2021/22	2022/23	2023/24	2024/25	2025/26
WLR	£ / sub / month	11.10	11.10	11.10	11.10	11.10
Additional charge for the bitstream product	£ / sub / month	16.84	15.85	14.96	14.15	13.41
Maximum price (inclusive of WLR)	**£ / sub / month**	**27.94**	**26.95**	**26.06**	**25.25**	**24.51**

Source: Frontier

The maximum price (including WLR) for 2021/22 is estimated at £27.94/month and reduces to £24.51/month in 2025/26, with the (unweighted) average price over the 5-year charge control period being £26.14/month. The reduction over time reflects two overarching trends: (1) a reduction in annual costs for wholesale broadband

[3] Each year runs from 1st October to 30th September of the following calendar year

services and (2) an expected increase in the number of broadband subscribers, which means these costs are recovered over a larger customer base.[4]

[4] The broadband subscriber base is expected to grow by 1.5%/year over the period, consistent with historical growth.

1 INTRODUCTION AND CONTEXT

In this section of the report, we first set out our understanding of the current state of the fixed broadband market in Jersey, at the retail and wholesale level. We then formulate the overarching objectives of this wholesale price review, based on the Jersey Government's objectives. We conclude this section by outlining the scope of this report and its structure.

1.1 Fixed broadband market in Jersey

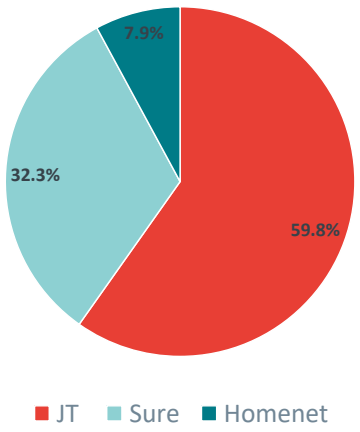
1.1.1 Retail market

Fixed broadband services in Jersey are predominantly provided over fibre-based technology. The incumbent JT started to invest in Fibre-to-the-Premises (FTTP) infrastructure in 2012 and by 2018 achieved island-wide coverage. After completing its FTTP roll-out, JT has migrated its retail and wholesale customers to fibre and decommissioned its copper network. In 2019, JT's retail market share was 59.8%.[5]

In addition to JT, there are two other fixed broadband operators in Jersey: Sure Jersey and Homenet. They provide retail broadband services using wholesale access to JT's FTTP network. Homenet also provides services using its WiMax and FTTP networks, although its FTTP network has limited coverage. In 2019, Sure's market share was 32.3% and Homenet's market was 7.9%.[6] We also understand that Airtel – currently a mobile only operator – is planning to launch retail broadband services using wholesale access to JT's network in the next few months.

Figure 2 below shows the market share by number of subscribers in 2019.

Figure 2 Fixed broadband market shares by number of subscribers in 2019



Source: Telecommunications Statistics and Market Report 2019

[5] Market shares sourced from the Telecommunications Statistics and Market Report 2019.

[6] Ibid

Figure 3 below provides an overview of the retail plans available to broadband customers in Jersey. Generally, there are two types of plans - with download speeds of 500 Mb/s or 1 Gb/s maximum, which correspond to the wholesale access products available in the market.[7] JT's plans have data caps, ranging between 20GB and 300GB, while Sure offers unlimited broadband plans. Monthly prices for these plans start at £44 for packages with 500 Mb/s download speed and increase to £78-81 for packages with 1 Gb/s speed.

Homenet's packages are significantly cheaper - £26-32. However, it is not clear whether they are comparable to other offers in terms of speed and availability.

Figure 3 Overview of fixed broadband plans

Operator	Download speed	Data allowance	Monthly price (excl GST)
JT[8]	500 Mb/s	20 GB	£44
	500 Mb/s	100 GB	£49
	1 Gb/s	300 GB	£81
Sure[9]	500 Mb/s	Unlimited	£45.75
	1 Gb/s	Unlimited	£78
Homenet	unclear	Unlimited	£26.24 ("Green" package)
			£32.50 ("Blue" package)

Source: Frontier Economics, based on the information provided on the operators' websites (as of 11/06/2021)

Note: Triple play services combining broadband, mobile and landline were not considered.

In March 2020, in response to the Covid-19 pandemic, all customers on the JT network had their speed boosted to symmetrical 1 Gb/s at no extra cost.[10]

Fixed broadband take-up

In 2019, fixed broadband penetration in Jersey was slightly higher than in the EU on average (82% in Jersey vs. 78% in the EU on average). However, eleven countries in the EU have higher fixed broadband penetration. Some of these countries have lower incomes than Jersey (Hungary, Estonia) or more challenging topography (Sweden, Denmark).

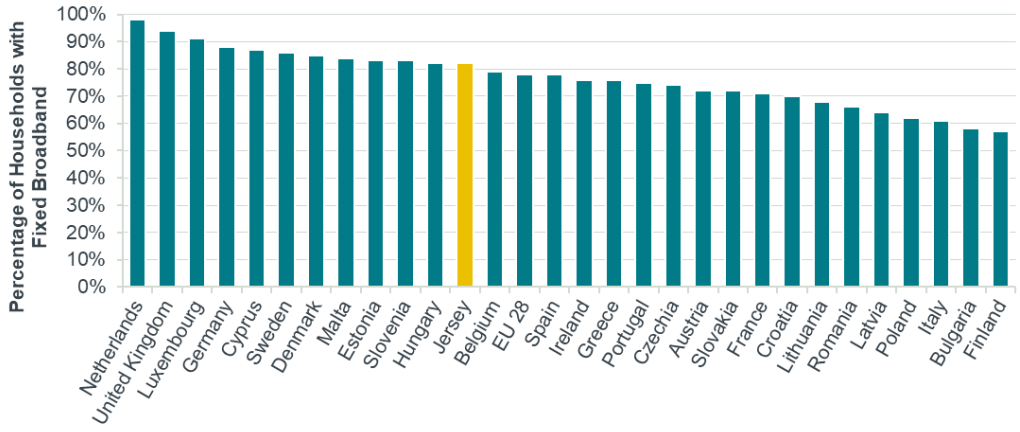
7 We discuss the wholesale products in more detail in Section 1.2 below.

8 JT data allowances apply from 8am-midnight

9 Prices relate to Sure's "Unlimited Broadband" packages. Sure have also introduced "Unlimited Pro Broadband" packages aimed as small businesses, which have lower contention and provides a fixed IP address, which are priced at £65 and £262 per month (excl. GST) for the 500 Mb/s and 1 Gb/s service respectively

10 https://www.ispreview.co.uk/index.php/2020/03/covid-19-everyone-on-jersey-to-get-1gbps-broadband-upgrade.html

Figure 4 Percentage of households with a fixed broadband subscription, 2019



Source: EU data from Eurostat. Jersey data calculated based on 1) fixed line subscriptions data from the Telecommunications Statistics and Market Report 2019; 2) number of households estimated as the population forecast for 2019 divided by the average number of persons per dwelling in the 2011 Jersey census.

It appears that affordability may be one reason for a relatively modest take-up of fixed broadband services in Jersey, as according to the 2019 Jersey Opinions and Lifestyle Survey, 29% of the households without fixed broadband connection said they could not afford it. There may also be substitution with mobile broadband.

We further observe that in other markets, consumers tend to have a choice between slower cheaper products and faster more expensive products. For example, in the UK, TalkTalk charges start at £23.50 per month (download speed of 38 Mb/s) and increase to £32 (download speed of 150 Mb/s). Vodafone charges £21.50 per month for products with download speed of 63 Mb/s, etc. Higher speeds are available in areas where BT has invested in FTTP, and range between £40 and £60 per month.[11] This range of choice may be one of the factors that support higher take-up of fixed broadband in the UK than in Jersey - at c.93%.

1.1.2 Wholesale market

In January 2019, the Channel Islands Competition and Regulatory Authority (CICRA), the predecessor of the JCRA, published its final decision on the "Market review: Market Definition and SMP findings". In this decision, JT was designated as an operator with Significant Market Power (SMP) in the market for:

> *"Wholesale access to the Internet at a fixed location using an access network based on fibre or cable or using the 4G and ultimately 5G wireless access network via a fixed device in the whole Bailiwick of Jersey."*[12]

As set out in its Telecommunications License, JT is obliged to provide access to its network to access seekers. When access is requested, this provision should

[11] https://www.ispreview.co.uk/index.php/2020/03/isp-bt-prices-new-uk-gigabit-and-full-fibre-broadband-plans.html

[12] https://www.gcra.gg/media/597964/broadband-market-market-review-final-decision.pdf

occur "*as soon as reasonably practicable and shall be provided on fair and reasonable terms, conditions and charges (…)".*[13]

More specifically, JT is required to offer access to its fibre active wholesale products, while access to its passive infrastructure is not required.

JT currently provides two types of wholesale broadband services to access seekers: wholesale broadband access services and bitstream.

Wholesale Broadband Services

These services provide access seekers with pre-defined download and upload speed options, with specific contention ratios. There are currently 3 standard and 2 superior wholesale access products available (summarised in Figure 5 below).

Figure 5 Overview of wholesale broadband services

Product type	Download speed	Upload speed	Contention	Price (excl GST)
Standard	500 Mb/s	50 Mb/s	40:1	£20.50
Standard	500 Mb/s	500 Mb/s	40:1	£36.75
Standard	1000 Mb/s	100 Mb/s	40:1	£52.92
Superior	500 Mb/s	50 Mb/s	10:1	£29.76
Superior	1000 Mb/s	100 Mb/s	10:1	£198.99

Source: JT Wholesale Broadband Agreement, Charges

In addition, OLOs are also required to pay £11.10 per month as a Wholesale Line Rental (WLR) charge. This charge applies equally to all customers, irrespective of whether they purchase 'voice only', 'broadband only' or voice and broadband together.[14]

Previously, JT provided wholesale access products with lower download speeds (50 Mb/s and 100 Mb/s). However, in the course of 2018 and 2019, these products were withdrawn and JT increased the download speeds to 250 Mb/s and 500 Mb/s, and more recently to 500 Mb/s and 1 Gb/s.

Bitstream product

In 2020, a new bitstream product was introduced with the maximum download speed of 1 Gb/s. This product allows OLOs to offer differentiated retail products as they can self-manage their customers' needs in relation to speed, contention and quality of service. As above, a WLR is also required to avail of the bitstream product. The additional price for the bitstream product is currently £20.15 per month (excluding GST),[15] meaning the total wholesale charge (including WLR) to provide a service to retail customers using the bitstream product is currently £31.25 per month.

[13] https://www.jcra.je/media/597633/t1248gj-revised-jt-licence.pdf

[14] In addition to the monthly charges, access seekers may incur certain one-off charges: connection charge of £15.72; change of bandwidth charge of £8.88; and take-over charge of £15.72.

[15] In addition to the monthly charge, non-recurring charges include: move of Broadband or Bitstream service with telephone service move to new premises - £15.72; move of Broadband or Bitstream service if requested after telephone service move to new premises have been completed - £15.72; change of billing / service details when telephone number is changed - £8.88; speed change - £8.88.

The current price for the bitstream product is an interim price. In February 2020 the JCRA issued a Final Notice which set out a price for the service, set by reference to a cost model. However, this Notice was appealed by JT. The appeal was subsequently withdrawn in June 2020 and the current interim price introduced, subject to this price review.

CP Interconnection services and one off-charges

In addition to the wholesale products described above access seekers need to purchase CP interconnection services, which provide a connection between JT's and access seekers' networks. There are also one-off charges, for example to connect customers.

Current regulation of JT's wholesale products

As set out above, there is an obligation on JT to provide access to its network on fair and reasonable terms. There is also an obligation to ensure that there is no margin squeeze, i.e. that the margin between its retail and wholesale price is sufficient for access seekers to cover their downstream costs and to compete with JT in the retail market[16].

We note that in June 2020, the JCRA fined JT for failing to maintain the appropriate downstream margin for fixed line broadband products and had previously directed JT to adjust its wholesale and retail prices.[17]

1.2 Overarching objectives for the price review

An overarching objective of the price review is to ensure that the pricing of wholesale access to JT's fibre network is regulated in a way that contributes to achieving the Jersey Government's telecoms objectives. These are set out in the Telecoms Strategy for Jersey and in the Telecoms Action Plan.[18]

In particular, the Jersey Government wants to ensure that the benefits of the JT FTTP network are maximised though effective service-based competition, i.e. access seekers are able to provide differentiated retail services to consumers at a competitive price:

> *"The benefits of fibre must be complemented by proportionate regulation so that all telecoms operators can offer retail services to customers that enable effective competition in the market, enabling as many residents as possible to access the service they require at efficient costs".*[19]

In line with this objective, the Strategy Action Plan makes the following recommendation:

> "*CICRA/JCRA should ensure that JT supplies other operators with wholesale access to the Gigabit network on a fair, reasonable and non-discriminatory (FRAND) basis, and that wholesale access seekers get*

16 JT's Licence Condition 34

17 JCRA, Contravention of licence condition 34 – financial penalty

18 https://www.gov.je/Industry/TelecomsStrategy/Pages/index.aspx

19 https://www.gov.je/Industry/TelecomsStrategy/Pages/JerseyTelecomsStrategyActionPlan.aspx

access to wholesale products, which allow access seekers to compete based on differentiated retail services."[20]

Based on the above, the key objectives of this wholesale price review are:

- **Enabling retail competition in the market**, by ensuring wholesale products allow access seekers to compete effectively and to provide a choice of retail products for consumers;
- **Achieving competitive prices,** ensuring that wholesale and hence retail prices are not excessive;
- **Maximising take-up** of broadband services on the fibre network; and
- **Incentivising JT to invest** by ensuring that JT is able to recover its efficiently incurred costs and to earn an appropriate rate of return on its investment.

We note that, unlike in some other jurisdictions in the EU, promoting network competition is not a policy objective. Instead, the Telecoms Strategy document states: "*On balance, encouraging network competition … is unlikely to be efficient or commercially feasible*."

It further recommends to "*promote retail competition (not network competition) as the most effective way of delivering the benefits of next generation connectivity to consumers and businesses*."

1.3 Scope of this review

The JCRA has engaged Frontier to support it in carrying out the price review of wholesale broadband access services in Jersey. Consistent with the Information Note issued by the JCRA[21], the overall scope of the work is to:

1) Assess the appropriate set of JT wholesale broadband products to be price regulated;
2) Assess the appropriate regulatory pricing regime, including the need for cost-orientated pricing for the wholesale products; and
3) Provide a recommendation on the appropriate level of prices for wholesale broadband products, using an appropriate cost model where required. This would primarily focus on the monthly rental prices.

Any recommendation on proposed regulation should follow international best practice, while recognising the need for a proportionate and pragmatic approach, tailored to Jersey.

We have also drawn on the views of relevant stakeholders that have been engaged during the development of the review, including the responses of stakeholders to the JCRA's consultation on its Draft Decision. These views have been gathered through workshops with key stakeholders, through information requests sent to both JT and access seekers, and through the JCRA's consultation process.

[20] Jersey Telecoms Strategy Action Plan, https://www.gov.je/Industry/TelecomsStrategy/Pages/FinalOxeraReportOnTelecomsStrategyForJersey.aspx#anchor-0

[21] JCRA, Wholesale broadband access services: price review, Information Note

The remainder of this report sets out the findings of our review:

- Section 2 sets out our assessment of the appropriate set of wholesale broadband products in Jersey;
- Section 3 then provides our assessment of the appropriate regulatory pricing approach for these wholesale broadband products;
- Section 4 outlines our assessment of the appropriate monthly rental prices for the wholesale broadband products, and the specification of the cost model that has been used to inform these prices; and
- Section 5 then provides our assessment of the pricing of JT's CP Interconnection Services and one-off charges.

The report also includes Annexes, which provide a more detailed overview of the cost model, and a high-level assessment of JT's cost of capital which feeds into this model. The Annexes also summarise the main changes made to the cost model following the JCRA's consultation process.

2 THE APPROPRIATE SET OF WHOLESALE BROADBAND PRODUCTS IN JERSEY

In this section we discuss what wholesale products best enable OLOs to provide differentiated broadband services to their customers, considering both the technical differences between the products and future OLO demand.

2.1 Our assessment of the required set of wholesale broadband products

It is important to establish what wholesale products are needed to enable OLOs to provide differentiated broadband services to their customers. There are two types of wholesale access products currently provided:

- Wholesale broadband products with pre-defined download speeds (500 Mb/s and 1 Gb/s) and pre-defined contention ratios. Previously, lower speed products were available, with download speeds of 50 Mb/s, 100 Mb/s and 250 Mb/s. However, these were gradually replaced with the current higher-speed products.
- The recently introduced bitstream product, which provides flexibility for OLOs to determine the speed they want to offer to their customers (up to 1 Gb/s).

We understand that before the bitstream product was introduced, Sure requested JT to re-introduce lower speed wholesale access products, with download speeds of 50 Mb/s and 100 Mb/s at a lower price. The JCRA consulted on this issue and recommended to re-introduce these two products.[22]

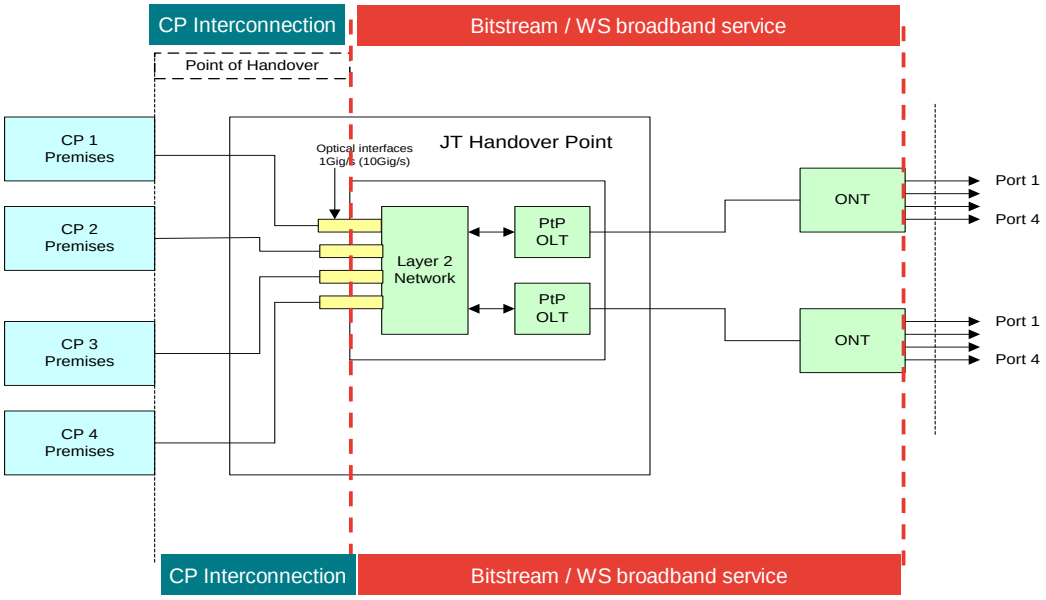
In the intervening period, however, the bitstream product was introduced and there was the boost in broadband speeds in response to the Covid-19 pandemic (noted above on page 10). These changes made the re-introduction of the lower speed wholesale services less urgent. Therefore the Initial Notice was withdrawn and the issue of how to support lower speed services has instead been considered in this review.

Technical differences between the products

In order to understand technical differences between the two types of products and OLOs' demand for them, we have issued data requests to JT and to OLOs. From the information provided by JT, we understand that both products (i.e. the wholesale broadband products and the bitstream products) utilise the same elements of JT's network and, therefore, from the network usage perspective, they are effectively identical. This is illustrated by Figure 6 below.

[22] WHOLESALE BROADBAND SERVICES – 50 AND 100 MBPS, https://www.jcra.je/media/598119/t1453gj-50-and-100mbps-broadband-access-final-decision.pdf

Figure 6 A diagrammatic representation of the network elements associated with the provision of bitstream and wholesale broadband products



Source: JT

The key differences between the two types of wholesale access products are the speed and contention ratios. While the wholesale broadband products have fixed speeds (currently 500 Mb/s and 1 Gb/s) and fixed contention ratios (40:1 and 10:1), the bitstream product allows OLOs to define speeds (up to 1 Gb/s) and contention ratios.

Demand for different wholesale access products

In order to assess demand for different types of wholesale access products, we asked OLOs to provide information on:

- The types of wholesale access services they are currently using; and
- whether they have demand for lower speed wholesale broadband products (i.e. speeds below 500 Mb/s).

Based on the OLOs' responses we understand that they are currently using/ planning to use the bitstream product. For example, Sure states[23]:

> "*Our preference, now that the bitstream service has been successfully launched, is for all of our customers to have their retail service underpinned by bitstream, rather than JT's wholesale broadband service*"
>
> *"Sure's preference would be to use a lower priced Bitstream product to achieve differentiation in the market, due to the greater control that this gives Sure as a service provider."*

Similarly, Homenet states: "[✂]".

[23] Sure's response to Frontier's data request

Airtel has expressed an interest in lower speed wholesale access products, [✂]. In particular, Airtel stated:

"[✂]"

Further, Airtel stated:

"[✂]"

Our assessment

Overall, the bitstream product is sufficiently flexible at a technical level to allow OLOs to provide differentiated services at the retail level and is more flexible than a set of wholesale access broadband products with pre-defined speeds.

For example, the bitstream product allows OLO A to provide services with a download speed of 200 Mb/s, while OLO B might choose to provide retail services with a download speed of 250 Mb/s. Moreover, OLOs can change the speed of their offerings over time, in line with consumer demand.

On the other hand, a set of wholesale broadband products with pre-defined speeds does not have the same flexibility. OLOs would need to request JT to change the speed of their offerings. Moreover, a product with a particular speed that an OLO might want, might not be provided by JT.

This assessment is also supported by OLO responses to the information request, with OLO's focusing on the bitstream product, and by responses to the JCRA's Consultation.

Therefore, we do not propose to require JT to provide additional wholesale access products with pre-defined speeds. We consider that if the bitstream product is priced appropriately, it should provide OLOs with the flexibility to offer differentiated services at the retail level.

2.2 Recommendation

In light of the above, we do not propose the JCRA require JT to introduce any additional wholesale products with pre-defined speeds, and that price regulation should focus on the bitstream product.

For the avoidance of doubt, in the context of this price review, we do not propose JCRA set regulated prices for the existing wholesale broadband products with 500 Mb/s and 1 Gb/s download speed. As explained above, these products are effectively becoming redundant, i.e. no longer demanded by OLOs. In light of this, setting the regulated price for these products is not required.

3 APPROPRIATE REGULATORY PRICING APPROACH

In this section, we first assess whether wholesale access to JT's network should be regulated based on cost-orientation or based on an ex-ante margin squeeze test. Based on our considerations, we propose JCRA set prices based on cost orientation and then go on to discuss the most appropriate approach to implementing this and over what time period.

3.1 Cost orientation vs. margin squeeze test

In principle, there are two approaches to regulating price of wholesale access products: 1) an approach based on cost-orientation and 2) an approach based on an ex-ante margin squeeze test.[24] More specifically:

- **Cost orientation**. Under this approach, wholesale prices are set on the basis of the cost of providing the service. It ensures that operators can cover costs that are efficiently incurred and receive an appropriate return on their invested capital.
- **Ex-ante margin squeeze test.** Under this approach, the wholesale price is not regulated directly. However, there is an assessment whether access seekers can profitably replicate the retail broadband offers of the SMP operator, given the level of wholesale prices charged by the SMP operator. In other words, this approach tests whether the margin between the wholesale and retail price is sufficient for access seekers to compete.

It is worth noting that the two approaches are different insofar as they aim to restrict different types of abusive behaviours.

- An ex-ante margin squeeze test aims to restrict the vertically integrated operator's ability to foreclose its downstream competitors by increasing its wholesale prices and/or decreasing retail prices to a point where it is no longer profitable for alternative operators to participate. Therefore, the margin squeeze test aims to ensure that the gap between wholesale and retail prices is large enough for rival retailers to recover their retail costs plus a reasonable rate of return.
- Cost orientation restricts excessive wholesale pricing by setting prices as close as possible to the costs of provision including a reasonable return on investment. This is the outcome that would be expected in an effectively competitive market.

3.1.1 The EC recommendations

While it does not apply in Jersey, the EC recommendations on regulated access to Next Generation Access (NGA) networks provide a useful starting point and precedent for considering the appropriate approach to adopt at this price review.

[24] Both these approaches are set out in the EC Recommendations in 2010.

The EC recommends that when establishing the most appropriate approach to wholesale regulation

"*NRAs should consider whether duplication of the relevant NGA access infrastructure is economically feasible and efficient. Where this is not the case, the overriding aim is to create a genuine level playing field between the downstream arm of the SMP operator and alternative network operators*". [emphasis added]

This is best achieved by imposing cost orientation. Indeed, the EC recommends that *"NRAs should in principle impose cost orientation on mandated wholesale broadband access products … taking into account differences in bandwidth and quality of the various wholesale offer."*[25]

However, the EC also recognises that if there is significant demand uncertainty, pricing flexibility at the wholesale level may be needed to promote further network investment. It its 2013 recommendation, the EC states:

"*Due to current demand uncertainty regarding the provision of very-high speed broadband services it is important in order to promote efficient investment and innovation … to allow those operators investing in NGA networks a certain degree of pricing flexibility to test price points and conduct appropriate penetration pricing*".[26]

If cost orientation is not put in place, the EC further recommends that an ex-ante margin squeeze is appropriate: *"In the absence of cost orientation NRAs should monitor the SMP operator's pricing behaviour by applying a properly specified margin-squeeze test."*[27]

It is worth noting that if wholesale prices are set based on cost-orientation, the risk of a margin squeeze is greatly reduced. Indeed, if wholesale prices are regulated at cost, a margin squeeze implies that an SMP operator charges retail prices below cost, foregoing profits. JT would be still subject to ex-post competition enforcement further mitigating any risk of margin squeeze.

3.1.2 Considerations in determining the appropriate pricing approach

In line with the EC recommendations, when deciding whether to implement cost-orientated wholesale pricing or a margin squeeze obligation, regulators take into account several key considerations. These include:

- ***Whether there is an objective to facilitate additional network roll-out and/ or to promote network-based competition***, i.e. to incentivise other operators and potential new entrants to invest in their own fibre networks - If this is the case, cost-based pricing may be less appropriate as it constrains wholesale returns and risks disincentivising further network roll out and network competition.

[25] Ibid, para 35

[26] The EC recommendation on consistent non-discrimination and costing methodologies to promote competition and enhance the broadband investment environment 2013, para 49.

[27] The EC recommendations on regulated access to Next Generation Access (NGA) networks (2010), para 36

- ***The level of predictability of wholesale costs*** – When setting cost-oriented wholesale access prices, regulators need information on demand for these wholesale services and on the cost of building and maintaining the network in order to determine prices. If future demand and costs are uncertain, there is a risk that cost-based pricing could lead to under-recovery or over-recovery of costs by the SMP operator. If there is a risk that the SMP operator is unable to recover its efficiently incurred costs, its incentives to invest will be reduced.
- ***The existence of external retail price constraints –*** Regulators also take into account whether there is a price constraint resulting from existing or future infrastructure based competition or cost-oriented legacy wholesale access prices (e.g. copper base services), which act as a constraint on SMP operators' ability to set excessively high prices for next generation access. For example, if there are cable operators or alternative fibre providers competing with the SMP operator in some areas, this would reduce SMP operators' ability to set excessively high prices at the retail level. Similarly, if the SMP operator continues to provide legacy (copper-based) products, which are regulated at cost, it would also act as a constraint on the SMP operators' pricing of its fibre products (as long as customers see these products as sufficiently close substitutes).

3.1.3 Our assessment

Given the specific circumstances of the Jersey market and the Jersey Government's objectives, we consider that it is appropriate to set JT's wholesale prices based on cost-orientation. As a result of that, the ex-ante margin squeeze test, which is currently in place, can be removed. The proposal was supported by all respondents to the JCRA's Consultation.

Cost-oriented pricing for JT is appropriate

We consider that, given the circumstances in the fixed broadband market in Jersey, it is appropriate to set wholesale access prices based on cost-orientation. This is due to the following considerations:

- **The demand and the cost of JT's network are predictable.** – JT has already achieved island-wide coverage and its FTTP network is fully established. Demand for its network is relatively predictable since all JT's customers (both retail and wholesale) have been migrated to fibre. Moreover, as the network is already built and has been operational for several years, build costs are known and future maintenance costs are predictable.
- **The Jersey Government's objective is to maximise the use of JT's network rather than to promote infrastructure-based competition** – as explained in Section 1.2 above, the Jersey Government's objective is to promote service-based rather than infrastructure-based competition.

  In light of that, it is appropriate to set regulated prices in a way that allows JT to recover its efficiently incurred costs and to earn an appropriate rate of return, rather than to incentivise access seekers to invest in their own fibre networks. This is achieved through setting cost-oriented wholesale prices.

- **The lack of external price constraints** – As discussed above, NRAs are more likely to allow an SMP operator flexibility to set wholesale prices subject to an ex-ante margin squeeze test, if there are external price constraints, e.g. alternative high-speed broadband products (e.g. broadband products provided over cable networks) or regulated wholesale products provided over legacy copper networks. However, in Jersey, these constraints do not apply. Indeed, JT has decommissioned its copper network and therefore, there are no alternative regulated wholesale products, which could act as a constraint on JT's pricing of its fibre products.[28] Moreover, alternative infrastructure providers do not provide an effective constraint.[29]

In light of the above, we recommend that JCRA set JT's wholesale prices on cost-orientation principles.

As noted above, wholesale line rental (WLR) is also required to provide a broadband service using the bitstream product. As such, cost-orientated pricing will be applied to the total wholesale charge, or "maximum price", which is the WLR charge plus the additional charge for the bitstream product (the "bitstream price"). This means that the total price paid to JT to provide a broadband service using the bitstream product is reflective of JT's cost of providing that service.

Ex-ante margin squeeze obligation on JT is no longer required

If JT's wholesale prices are set based on cost-orientation, we recommend that there is no need for the JCRA to further impose an ex-ante margin squeeze obligation. This is because the risk of a margin squeeze under cost-oriented wholesale pricing is significantly reduced.

Indeed, the most likely "mechanism" for a vertically integrated operator to engage in a margin squeeze is by increasing its wholesale prices rather than reducing its retail prices. However, with cost-oriented pricing this mechanism is removed, as JT loses the ability to increase wholesale prices.

In the UK, Ofcom allowed Openreach flexibility to set its wholesale prices during the early stages of the FTTC network deployment, but introduced an ex-ante margin squeeze test. However, when this approach was changed to cost-orientation, the ex-ante margin squeeze test was been removed and our proposed approach is consistent with this.

While the ex-ante margin squeeze is not needed going forward, the JCRA has the power under competition law to investigate whether JT engages in margin squeeze on an ex-post basis. This will help ensure compliance and provides the JCRA with the ability to investigate potential margin squeeze behaviours without a formal ex-ante test.

[28] This rules out an "anchor product" approach, such as the approach previously adopted by Ofcom.

[29] For example we understand that Homenet has rolled out fibre to a limited number of premises. However, its infrastructure is too limited to provide a constraint on JT's pricing.

3.2 Implementing cost-orientation

3.2.1 Top-down vs. bottom-up approach

There are two overarching approaches that can be used to develop a cost model:

1. A "top-down" approach. This models the existing network of the operator. Under this approach the cost-based price would reflect the actual costs incurred by the operator in building and maintaining that network.
2. A "bottom-up" approach. This models the network of a hypothetical operator. This involves forecasting the efficient level of demand, and identify the specific network assets that would need to be deployed by an operator to service that demand. The objective of this approach is to proxy the "competitive level" of prices, which would then send the appropriate "build-or-buy" signals to alternative operators that are choosing to either buy wholesale access or build a parallel network themselves. It can also provide an independent view of the efficient level of costs if there is a reason to believe the operator is inefficient.

3.2.2 Our proposed approach to modelling cost-oriented wholesale prices

For the purposes of informing the cost-based prices we have chosen to develop a "top-down" model. This is for the following key reasons:

- **This is consistent with the JCRA's and Jersey Government telecoms market objectives**. The key objectives are to incentivise JT to continue investing in its network by ensuring it is able to recover its efficiently incurred costs, and to enable competition in the market through allowing wholesale access to JT's network rather than through encouraging network competition. This means that the overarching focus of the pricing of wholesale broadband products is on recovery of JT's actual costs, which is more straightforward to achieve under the top-down approach.
- **JT's FTTP network is already well-established, having already been deployed to the vast majority of households in Jersey**. This means that there is data available to implement a top-down approach, i.e. the costs incurred by JT in deploying and maintaining the network, and the demand on that network.
- **A "top-down" model is proportionate to the small size of the jurisdiction**. Developing a bottom-up model is a complex exercise and requires a significant amount of input data and assumptions on demand and costs. A top-down model on the other hand is simpler and can draw on information that JT already collects as part of its annual regulatory accounting exercises and previous analysis of broadband pricing.

This approach was supported by all respondents to the JCRA's Consultation.

However, we recognise that the use of data on JT's actual costs may overestimate efficient level of costs if some of these costs have not been incurred efficiently. We have therefore made adjustments to JT's cost data where appropriate, and taken

into account expected efficiency gains when considering how JT's costs will evolve over time.[30]

We use the current value of JT's assets as it is consistent with the approach taken in Jersey previously. We also draw a distinction between different types of assets:

- "Legacy" assets, which were installed / built over a long period of time, have largely been depreciated and which have now been "re-used" for the JT FTTP network (e.g. ducts). For these assets we implement a RAB-style approach, with the initial value of the asset set at the accounting value, net of the accumulated depreciation, and adjusted by asset price trends. The forward-looking depreciation charges reflect changes in replacement costs and corresponding adjustments for holding gains and losses. The latter is needed to ensure that an increase (or decrease) in the value of the asset over time does not lead to over/under-recovery of investments through the depreciation charge.[31]
- "Newly built" assets that were installed recently, such as equipment installed or upgraded as part of JT's FTTP roll-out (e.g. FTTP access cabling). For these assets capital charges are calculated based on principles of tilted annuity. This implies that annualised capital costs for an asset should reflect changes in replacement costs, i.e. to be higher in periods when the replacement cost is higher, and to be lower in periods when replacement costs are lower.[32]

3.2.3 The time period considered

We recommend to set cost-oriented wholesale prices for a five year period. Using a five year charge control period is consistent with the EC recommendations. The EU Directive states:

> *"in the interest of greater stability and predictability of regulatory measures, the maximum period allowed between market analyses should be extended from three to five years, provided market changes in the intervening period do not require a new analysis."*[33]

Similarly, Ofcom has recently extended the duration of its market reviews from three to five years in order "*to provide longer-term regulatory certainty and support for competitive investment in fibre networks*"[34] and similar considerations apply to Jersey.

The JCRA plan to introduce the charge control from October 2021, meaning the five-year period would equate to October 2021 to September 2026.

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30 Our proposed efficiency adjustments are discussed in detail in Annex A.

31 More details on the implementation of cost annualisation for legacy and newly-built assets are provided in Annex A.

32 We note that in the Frontier report issued alongside the JCRA's Draft Decision, a distinction was instead made between "replicable and "non-replicable" assets. We confirm that this is just a semantic change, and that the categorisation of assets into those where a RAB-style and tilted annuity approach is applied remains unchanged. Further detail on this can be found in the JCRA's Final Decision.

33 DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 establishing the European Electronic Communications Code

34 See for example Ofcom (2019) "Promoting competition and investment in fibre networks Consultation" https://www.ofcom.org.uk/__data/assets/pdf_file/0018/142533/consultation-promoting-competition-investment-approach-remedies.pdf

4 COST-ORIENTATED PRICES FOR WHOLESALE BROADBAND PRODUCTS

In this section, we first set out two potential approaches to setting the cost-oriented "maximum price" for the bitstream service, a fixed fee and a two-part tariff approach. We set out our approach to cost modelling only under the fixed fee approach, which has been chosen following the JCRA's Consultation.[35] We conclude the section with recommended "maximum prices" under the fixed fee approach. Further details of the modelling approach adopted are provided in Annex A.

4.1 Potential pricing structures

4.1.1 A fixed fee vs. a two part tariff

Currently, the additional charge for the bitstream product (in addition to WLR) is a single "flat" fee i.e. does not vary by speed or the level of contention.

As set out in Section 1.2, ensuring that wholesale products allow access seekers to compete effectively and to provide a choice of retail products for consumers is one of Jersey Government's key objectives.

Further, in Section 2, we explained that OLOs' preference is to use the bitstream product as it allows them to offer differentiated speeds for their customers. However, we considered that although OLOs have the technical ability to control the speed and to offer retail products with different speeds to their customers, the incentives for them to do so may be limited by the current pricing structure of the bitstream product, which does not vary by speed or by data usage.[36]

In order to incentivise OLOs to offer lower speed products (alongside higher speed products) and therefore to provide a wider choice for customers, we considered an alternative pricing structure – a "two-part tariff". This pricing structure implies that the additional charge for the bitstream price consists of two charges:

- **A fixed fee** - which is uniform across all customers and does not vary by speed or by data usage; and
- **A variable fee** - which is based on data usage during busy hours (BH usage).[37]

Under this alternative pricing structure, OLOs would pay a lower wholesale charge if they offer lower speed retail products and a higher charge if they offer higher speed products. Indeed, lower speeds would imply lower data usage during the

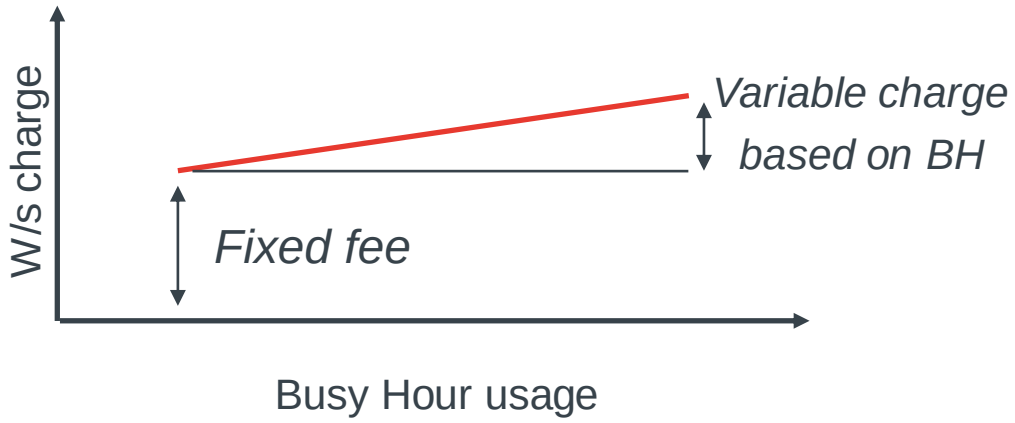
[35] We note that the fixed fee and two-part tariff approaches are mutually exclusive. A discussion of how to implement the two-part tariff was included in the Frontier report issued alongside the JCRA's Draft Decision, but is not included here as the approach has not been chosen.

[36] If OLOs are charged the same price for the bitstream product, irrespective of whether they provide a 1 Gb/s service to their retail customers or a 100 Mb/s speed service, their incentives to offer low speed products are likely to be reduced.

[37] Our proposal is to define wholesale charges in terms of BH data usage rather than in terms of pre-defined speeds, as it preserves OLOs' ability to set speeds based on their customers' demand (rather than to rely on a set of wholesale products with pre-defined speeds). OLOs are also able to offer different speeds depending on the types of customers they want to target. This would further promote retail product-differentiation and potential competition.

busy hour period and would result in a lower charge overall (this is illustrated by the diagram below).

Figure 7 An illustration of the two-part tariff



Source: Frontier

4.1.2 Our assessment of the two approaches

We note that both approaches have their strengths and weaknesses.

A fixed fee

The advantages of this approach are two-fold:

1) it is consistent with the current approach and straightforward to implement; and
2) it minimises the risks of over- or under-recovery of JT's costs. As the wholesale charge does not vary by customer, the main uncertainty is associated with the total number of broadband customers on JT's network. However, given that JT does not face network competition, the total number of customers on JT's network is fairly predictable.

However, as noted above this approach does not actively incentivise product differentiation and may focus competition on higher speed products. Therefore, a fixed fee may not be fully consistent with Jersey Government's objective to encourage product differentiation at the retail level.

A two-part tariff

The benefit of this approach is that it provides stronger incentives for OLOs to offer differentiated retail products, including lower speed products. It may also be expected to increase the fixed broadband take-up, as lower speed products are likely to be more affordable than higher speed products.

However, this approach also has disadvantages:

- It is more complex to implement. In particular, OLOs would need to decide how to price their retail products (differentiated by speed) in light of the wholesale charges, which are based on BH usage.
- Further, the risk of under- or over-recover of JT's costs is greater than under a fixed fee. This is because it is not known at this stage how many customers would migrate to lower speed products, albeit, this can be informed by the evidence from other jurisdictions (which us a similar approach) and by OLOs' projections of customer demand for different speeds.
- It would increase data reporting requirements for both JT and OLOs, as they would need to record busy hour usage and ensure that OLOs are billed appropriately.

Taking into account responses to the JCRA's Consultation, the JCRA has concluded that the fixed fee approach is the most suitable approach for setting the prices for the bitstream product, as it considers the additional complexity and risks arising from a two-part tariff are likely to exceed its potential benefits. We also note that whilst the fixed fee approach does not actively incentivise product differentiation, this remains possible under this approach, as the bitstream product allows OLOs to set the speed and level of contention for each customer.

Below, we therefore only discuss the modelling approach and assumptions under the chosen fixed fee approach, and the prices under this approach.

4.2 Specification of the cost model

4.2.1 Scope and methodological approach

The purpose of the cost model is to estimate cost-based monthly rental prices for JT's bitstream service for the period October 2021 to September 2026, under the "fixed fee" pricing structures. The model calculates the cost-based price for the overall cost of providing bitstream, which is then used to set the "maximum price" for the bitstream product i.e. the combined WLR charge and additional charge for the bitstream product (the "bitstream price"). The bitstream price is then the difference between this maximum price and the price of WLR. By setting the "maximum price" for the bitstream product to reflect JT's costs, the approach ensures that the total price paid for a customer serviced using bitstream is reflective of costs.

The overarching objective of the prices is to ensure JT recovers an appropriate level of costs, including an appropriate return on investment, from the provision of the bitstream product. This is the cost that allows JT to recover the overall cost of its FTTP network, taking into account that a share of those costs should also be recovered from other wholesale broadband charges (such as connection charges), and the other services that JT provides over this network infrastructure (i.e. retail broadband, fixed voice, and leased line services).

As explained in Section 3, we have developed a "top-down" cost model to inform the maximum price for the bitstream product. This uses the actual costs incurred by JT, but adjusts these for efficiencies that JT would expect to make over the period. These costs include the cost of the FTTP network, including the annualised

capital costs and operating costs of the network, as well as other direct costs associated with providing fixed wholesale services (such as JT's wholesaling team). They also include a share of other costs which support the provision of both FTTP and non-FTTP services (such as JT's building stock and billing systems).

The table below summarises the methodological approach that underpins the cost model, including the specific scope of the model. The chosen approach accounts for international best practice in the development of cost models, including the recommended costing approach outlined in the EC's 2013 Costing Recommendation. It has however been tailored to the specific market situation in Jersey, and reflects the JCRA's objective to ensure a proportionate approach. Further detail on each element of the approach is provided in Annex A.

Figure 8 Scope and methodological approach underpinning the cost model

Element	Approach	Rationale
Model scope		
Modelled charges	The "overall bitstream cost" i.e. the full cost of bitstream (WLR plus the bitstream price)	The bitstream product requires that the customer also has WLR. Approach ensures that the total price paid for a customer serviced using bitstream is reflective of costs.
Service scope	W/s broadband (Bitstream), and all other JT services provided using the same network / cost elements (fixed voice, leased lines, retail and mobile services)	The costs for a given network element / cost category should be recovered from all services driving those costs.
Network scope	The existing JT FTTP network as of June 2020 *(does not reflect the additional cost of serving new-build premises, or demand from these premises)*	▪ Not material: expected Jersey household growth of ~1%/yr. ▪ Conservative: expected cost of serving a new household is similar if not smaller than for an existing household. ▪ Proportionate: Avoids adding significant complexity to the model
Costs considered	Network capital costs (e.g. FTTP access network, exchange equipment, Core network links and routers, voice platform costs, buildings) Network operating costs (e.g. repair and maintenance). Wholesaling costs (JT wholesaling team, operating / billing systems). Common costs (e.g. share of HR / Finance costs) Does not include potential cost of replacing assets from High Risk Vendors (HRVs)	Reflects costs incurred to support the provision of wholesale broadband services. Cost of HRV equipment not included: ▪ Unclear at this stage what the magnitude of these costs will be (e.g. depends on which HRV equipment needs to be replaced). ▪ It's a policy decision whether these costs should be recovered from broadband customers or from Government. ▪ Can be considered at a later date when decisions on HRVs have been made.
Time period for pricing	2021-2026	Reflects chosen price control period
Key methodological choices		
Price base	Nominal *(cost trends are inclusive of expected inflation)*	Model prices for each year of the price control period without the need to adjust for inflation each year

Element	Approach	Rationale
Model type and cost standard	Top-down Fully Allocated Costs (FAC)	▪ Ensure JT recovers its actual incurred costs. ▪ Proportionate given the small size of the jurisdiction ▪ Consistent with approach to setting the interim bitstream price.
Asset valuation method	Current Cost Accounting (CCA)	▪ Consistent with precedent in Jersey.
Capital cost annualisation approach	"Legacy" assets (e.g. ducts, buildings): RAB-type approach, with holding gain (HG) adjustment "Newly built" assets (e.g. fibre cables, ONTs etc): tilted annuity reflecting asset price trends.	▪ RAB-type approach ensures that for older assets that have been re-used for the FTTP network, only the remaining value of these assets is reflected in the bitstream price. ▪ HG adjustment ensure changes in duct / building asset value doesn't lead to over-recovery of costs. ▪ Tilted annuity approach for newly built assets ensure the efficient recovery of these costs (more costs are recovered in periods when replacement costs are higher).
Efficiency adjustments	Operating cost efficiencies *(Opex trends reflect inflation and efficiency gains)*	▪ Ensures JT recovers only its efficiently-incurred costs. ▪ Consistent with approach in other jurisdictions (e.g. Ofcom in UK)

4.2.2 Proposed prices under the "Fixed fee" structure

Key calculation steps and inputs

Under the "fixed fee" pricing structure, the bitstream rental price is a single monthly price per broadband subscriber in each year from October 2021 to September 2026. The overall bitstream charge including WLR, or "maximum price", is therefore also a single price for each year.

To inform the prices, the model calculates a monthly cost per broadband subscriber for the provision of wholesale broadband services in each calendar year. This is done by identifying the appropriate costs to be recovered from these services in each year, and then dividing this cost by the estimated number of broadband subscribers in those years. These annual estimates are then pro-rated to reflect that the charge control years run from October to September.[38]

Currently, an OLO taking the bitstream product must also take Wholesale Line Rental (WLR)[39], and it is not proposed to change this structure as part of this review. Consistent with this, the overall bitstream charge i.e. WLR plus the additional charge for the bitstream product, is set to reflect the unit cost of providing wholesale bitstream.

[38] The pro-rating is done based on the number of months in each calendar year that is included in a given charge control year. For example, the estimated price for the charge control year October 2021 to September 2022 is based on 9 months in 2021 and 3 month in 2022 i.e. (3/12)*2021 price + (9/12)*2022 price.

[39] The WLR applies both to voice only customers and to broadband customers.

In practice, the model follows four main steps to estimate the monthly overall bitstream charge:

1. The model estimates demand on the JT FTTP network in each year over the modelling period. This includes the number of broadband subscribers on the JT FTTP network, but also fixed voice subscribers.
2. The annual capital and operating costs relating to the FTTP network are then calculated.
3. The share of the costs to be recovered from wholesale fixed broadband rental services is then estimated.
4. The overall maximum bitstream charges are then calculated by dividing the costs in each year from step 3 with the forecast broadband subscriber base from step 1, and converting this into a monthly value.

The set of key inputs and assumptions used in these calculations is outlined in full in Annex A of this report, as well as the evidence to support this. The value of the inputs has been informed by data provided by JT, as well as by OLOs in response to information requests for this review, and responses to the JCRA's Consultation. Where relevant and applicable to Jersey, we have also drawn on data from the UK and other justifications, in particular assumptions used in cost models developed to inform wholesale broadband prices.

The estimated overall bitstream charge, or "maximum price"

The overall bitstream charges (i.e. WLR + additional bitstream charge), for the period October 2021-September 2026 are presented in Figure 9 below. An estimate of the additional bitstream charge is also provided, assuming that the WLR charge remains at the current £11.10/month price over the price control period.

The overall bitstream charge for 2021/22 (i.e. October 2021-September 2022) is estimated at £27.94/month, reducing to £24.51/month in 2025/26. This represents an (unweighted) average price over the 5-year charge control period of £26.14/month. The reduction over time reflects two overarching trends[40]:

- An expected reduction in annual costs for wholesale broadband services, including a reduction in both capital and operating costs over time.
- An expected increase in the number of broadband subscribers, which means these costs are recovered over a larger base of customers.

[40] These are explained in more detail in Annex A of this report.

Figure 9 Estimated cost-based "maximum price" for JT's Bitstream service: 2021/22 – 2025/26

		2021/22	2022/23	2023/24	2024/25	2025/26
WLR	£ / sub / month	11.10	11.10	11.10	11.10	11.10
Additional charge for the bitstream product	£ / sub / month	16.84	15.85	14.96	14.15	13.41
Maximum price (inclusive of WLR)	**£ / sub / month**	**27.94**	**26.95**	**26.06**	**25.25**	**24.51**

Source: Frontier

5 ASSESSMENT OF OTHER CHARGES

In addition to the monthly overall rental price for the bitstream product, OLOs also face a range of other charges, which can be split into (i) one-off charges, such as connection charges and customer migration charges, and (ii) CP Broadband Interconnection charges. These are discussed below.

5.1 One-off charges

In addition to the monthly charges, OLOs may incur certain one-off charges, e.g. connection charge of £15.72; change of bandwidth charge of £8.88; and take-over charge of £15.72:

- Change of bandwidth charge - As OLOs transition from the wholesale access products with fixed speeds to the bitstream product, they will be able to control the speed of service they provide to their customers. This means that the "change of bandwidth" charge will no longer be needed.
- Connection and takeover charges - we understand that the JCRA previously assessed these charges in the context of Cable Wireless / JT dispute.[41] In light of that, the JCRA did not require us to review these charges at this stage.

Our assessment

We understand from the JCRA that the one-off charge had been subject to review in the past, and that some of those charges would no longer apply with wholesale bitstream (e.g. the change of speed charge). It is not expected that the remaining charges will change. We note that some of JT's costs from providing wholesale broadband services is recovered through the one-off charges, and this has been reflected in the cost model used to inform the overall bitstream charge (more details on this can be found in Annex A of this report).

5.2 CP Interconnect charges

In addition to the WLR and bitstream product, OLOs also acquire from JT CP Broadband Interconnect services. This is a form of leased lines, which connect JT's layer 2 aggregation network to OLOs' Point of Presence (PoP).[42]

JT offers a number of CP Broadband Interconnect Services with different bandwidths[43]. The prices of these services are set in line with prices of JT's existing wholesale leased line products (as set out in Figure 10 below). For example, JT currently charges £15,096 per annum for a 1Gbit/s fibre link and for a 1Gbit/s CP

[41] https://www.jcra.je/media/1739/t589-10-final-notice-proposed-determination-regarding-adsl-broadband-takeover-charges.pdf

[42] Based on JT's response to our data request, we understand that initially OLOs had to purchase a separate CP Broadband Interconnect Service for the wholesale broadband access products they used and for the bitstream product. However, this requirement has been subsequently removed from the wholesale broadband agreement.

[43] Section 1 of the document WBA v4.5 Charges 2020 (CG review)

Interconnect product. Prices for JT's Interconnect products with higher bandwidth are set as: £15,096 * bandwidth^ n, where n=0.61264285.

Figure 10 Prices of JT's CP Interconnect services

Product Name	Speed	Wholesale price (Per annum)
1 Gb/s Fibre Lan Link	1 Gb/s	£15,096
2 Gb/s Fibre Channel	2 Gb/s	£24,144
4 Gb/s Fibre Channel	4 Gb/s	£34,988
1 Gb/s Fibre Broadband Interconnect	1 Gb/s	£15,096
2 Gb/s Fibre Broadband Interconnect	2 Gb/s	£24,144
4 Gb/s Fibre Broadband Interconnect	4 Gb/s	£34,988
6 Gb/s Fibre Broadband Interconnect	6 Gb/s	£45,247
8 Gb/s Fibre Broadband Interconnect	8 Gb/s	£53,968
10 Gb/s Fibre Broadband Interconnect	10 Gb/s	£61,873

Source: JT

Our assessment

Regarding JT's CP Interconnect services, we understand that the JCRA is in process of reviewing the Business Connectivity market in Jersey, focusing specifically on the price of leased lines. In its BCMR consultation, the JCRA states that:

"*Retail prices of leased lines on Jersey are high compared with comparator countries. For example, a 1 Gbps AI leased line on Jersey costs approximately twice the equivalent on Iceland and the Isle of Man. This differential is more pronounced when compared to the UK, where a wholesale 1 Gbps leased line costs 6 times less than a similar line on Jersey*."[44]

The JCRA's preliminary finding is that JT has SMP in the wholesale market for leased lines. It proposes to impose a price control for wholesale leased lines, with the main new intervention being to require JT to offer 'dark fibre'. It is expected that access to dark fibre will expose more of the value chain to competition, facilitate product and price innovation, enable greater carrier diversity and support more flexible mobile backhaul.[45]

Assuming that the dark fibre remedy is implemented, as recommended in the Consultation document, the price of leased lines is expected to decrease going forward. In light of that, it is important that JT reviews its prices of the CP Interconnect services and ensures that these prices are also reduced in line with the prices of leased lines.

However, we recognise that the impact of the dark fibre remedy might take some time to materialise. Therefore, in order to protect OLOs from any potential price

[44] https://www.jcra.je/media/598280/t-012-business-connectivity-market-review-draft-decision.pdf

[45] Ibid

increases in the transition period, we recommend to introduce safeguard caps for the CP Interconnect products (with the caps set at the current level of prices).

ANNEX A COST MODEL OVERVIEW

As noted in the main body of the report, we have developed a cost model to inform the cost-based monthly rental prices for the "maximum price", or overall charge, for JT's bitstream product. This consists JT's Wholesale Line Rental (WLR) charge, which is charged to OLOs for broadband customers served using the bitstream product, and an additional charge for the bitstream product. The estimated prices apply for the period October 2021 to September 2026, and have been calculated under the "fixed fee" pricing structure described in Section 4.1: (i.e. a single charge per broadband subscriber).

This annex provides a more detailed description of the final cost model. In particular, this annex outlines the following:

- The methodological approach underpinning the cost model and the model scope. This includes the type of model that has been developed, and the set of costs considered in the model; and
- The model calculation steps and key inputs.

For each we provide the rationale and evidence for our choice, and outline how these have been implemented in practice.

We note that the focus of this annex is to outline the approach and assumptions used in the final cost model, rather than explaining all of the changes made following the JCRA's Consultation. These changes are discussed in detail in the Final Decision. A high-level overview of the changes is also provided in Annex C of this report.

A.1 Methodological approach underpinning the cost model

The overarching objective of the cost model is to ensure that the overall bitstream charge allows JT to recover an appropriate set of costs from the provision of wholesale broadband services. This is the cost that allows JT to recover the total cost of providing services on its FTTP network, taking into account that a share of those costs should also be recovered from other wholesale broadband charges (such as connection charges), and the other services it provides over this network infrastructure (i.e. retail broadband, fixed voice, and leased line services).

In practice, the model calculates monthly cost per fixed broadband subscriber for the provision of wholesale broadband rental services in each calendar year. This is done by identifying the appropriate annual capital and operating costs to be recovered from these services, and then dividing this by the number of fixed broadband subscribers on the JT network in each year. These annual estimates are then pro-rated to reflect that the charge control years run from October to September.[46]

[46] The pro-rating is done based on the number of months in each calendar year that is included in a given charge control year. For example, the estimated price for the charge control year October 2021 to September 2022 is based on 9 months in 2021 and 3 month in 2022 i.e. (3/12)*2021 price + (9/12)*2022 price.

In developing the model, there were five key methodological choices that had to be made:

- Model type;
- Cost standard;
- Asset valuation approach;
- Approach to annualising capital costs; and
- The price base for the model.

We discuss our chosen approach in each of these areas below. The specific implementation of the fixed fee approach is then explained in Section A.3.

A.1.1 Model type

There are two overarching approaches that can be used to develop a cost model:

1. A "top-down" approach, which considers the actual network of the operator. Under this approach the cost-based price would reflect the actual costs incurred by the operator in building and maintaining that network.
2. A "bottom-up" approach, which models the network of a hypothetical operator. This involves forecasting the efficient level of demand, and identifying the specific network assets that would need to be deployed by an operator to service that demand. The objective of this approach is to proxy the "competitive level" of prices, which would then send the appropriate "build-or-buy" signals to alternative operators that are choosing to either buy wholesale access or build a parallel network themselves. It can also provide an independent view of the efficient level of costs if there is a reason to believe the operator is inefficient.

For the purposes of informing the cost-based overall bitstream charge we have chosen to develop a "top-down" model. As explained in Section 3 of this report, this approach is consistent with the objectives for the review and the Jersey Government's Telecoms Action Plan, and is proportionate. It is also implementable, given detailed data on the cost of and demand on JT's FTTP network is available.

It is however important to ensure that the costs considered in the model reflect efficiently-incurred costs, and that the model leads to wholesale prices that are efficient. To reflect this:

- The cost trends within the model take account of efficiency gains that JT would expect to make over time[47]; and
- The approach to annualising capital costs means that the implied profile of recovery of costs is efficient.

A.1.2 Cost standard

The cost standard defines the method of distributing costs between services. This is required because certain costs support the provision of multiple services. In general, there are three main sets of costs that need to be considered:

[47] These efficiency gains are explained in more detail in Section A.3.2 of this annex.

1. “Direct” costs. These are costs incurred purely for the delivery of an individual service (e.g. voice platform costs for the provision of fixed voice services).
2. Joint and common network costs. These are network costs that support the provision of a number of different services (e.g. duct and trenching in the JT access network);
3. “Corporate overheads” (or non-network common costs). These are costs that are not directly associated with the provision of an individual service (e.g. costs associated with the Chief Executive).

There are two main allocation methodologies that can be used to develop a cost model, which differ in how joint and common costs are allocated:

1. Fully Allocated Costs (FAC). This is based on the actual costs incurred by the regulated operator. Under this approach joint and common costs are allocated to each service using allocation keys.
2. Long Run Incremental Average Cost (LRIAC+). This sets the cost of a service equal to the change in the total “long run” cost resulting from a change in the demand to that service, with a portion of joint and common costs then added to this.

The relevant approach depends on the type of model that is implemented, with the FAC approach generally used under the top-down approach, and LRIAC+ used in bottom-up models.

As we have developed a top-down model, we have used the FAC cost standard. The specific approach to allocating costs between services in the model is outlined in Section A.3 below.

A.1.3 Asset valuation approach

There are again two main approaches to valuing assets in developing cost models:

1. Historical Cost Accounting (HCA). Under this approach the value of an asset is set equal to the original cost of the asset when it was purchased and deployed in the network.
2. Current Cost Accounting (CCA). Under this approach assets are valued at the replacement cost of the asset; this is the cost of purchasing the asset today. In top-down models, current costs can be estimated by inflating the historical value of assets to replacement costs based on trends in asset prices.

We value all assets on a CCA basis in the cost model, which is consistent with the precedent in Jersey.

The specific implementation of this approach is explained in section A.3 below.

A.1.4 Capital cost annualisation approach

As outlined in Section 3 of this report, there are a number of different approaches that can be used to annualise capital costs. As explained in that section, we take a different approach for “legacy” and “newly-built” assets:

1. “Legacy” assets, which were installed / built over a long period of time, have largely been depreciated, and which have now been “re-used” for the JT FTTP

network (e.g. duct/trenching and buildings).[48] For these assets we use a RAB-type approach, where depreciation charges and asset valuation are based on an accounting approach adjusted to current costs by applying a price index. This ensures the recovery of costs for these long lived assets is consistent with the recovery of costs to date, and therefore that only the remaining value of these assets is taken into account. Under this approach we also adjust the annualised costs for holding gains and losses, which result from changes in the value of these assets over time. This ensures that an increase (or decrease) in the value of the asset over time does not lead to over/under-recovery of investments.

2. "Newly built" assets that were installed recently, such as equipment installed or upgraded as part of JT's FTTP roll-out (e.g. FTTP access cabling). For these assets, we use a "tilted annuity" approach, which "tilts" the recovery of costs based on the expected trend in asset value over time. Given these assets were relatively recently installed this provides a more stable forward looking cost recovery profile than an approach based on accounting valuation and depreciation. The application of asset price tilts also results in an efficient profile of cost recovery for these assets, as it ensures that more costs are recovered in periods when the replacement cost of the asset is higher.

The specific application of these approaches in practice is again explained in Section A.3 below.

A.1.5 Model price base

In developing costs models, forecasts can either be calculated on a nominal or real basis.

- When calculating costs on a nominal basis, the expected trends in capital and operating costs take into account expected inflation. This results in nominal cost-based prices i.e. prices that do not need to be adjusted for inflation over time.
- In contrast, when calculating costs on a real basis, costs trends do not account for inflation. In this case, the resulting estimated prices need to be adjusted for inflation over time.

We have modelled costs on a nominal basis within the cost model. This is a simpler approach, as it means the implemented prices do not need to be adjusted each year based on the inflation in that year.

Given this, and that we take consideration of potential cost efficiencies, this means that future trends in capital and operating costs reflect expected cost inflation net of expected efficiency gains.

[48] We note that some of the assets in these categories could be newly-built, e.g. potential duct replacements during JT's FTTP roll-out. However we understand that the proportion of these assets that are newly-built is small, and that it holds that the current set of these assets in JT's network have been built over a large number of years, and are generally heavily depreciated. As such, we believe the annualisation approach taken for these assets is appropriate.

A.2 Model scope

In addition to the overarching methodological approach, decisions also need to be made on the scope of the model.

Under a top-down modelling approach, the scope of the model covers two main areas.

1. Network scope, i.e. the network footprint that the model considers; and
2. Cost scope, i.e. the types of JT costs that are considered in the model.

These are considered in turn below.

A.2.1 Network scope

Although the JT FTTP network has been fully deployed, the footprint of the network will marginally expand over time. This is because the set of households and business premises in Jersey will grow over time, which will require JT to extend its network to these premises.

For the purposes of developing the cost model, we have chosen to model only the existing footprint of the JT FTTP network, i.e. we do not consider extensions to the network due to household or business premise growth over time. This impacts both the modelling of costs and demand in the cost model:

- Regarding costs, we do not estimate the additional capital investments needed by JT in order to extend its network to new-build premises, or additional operating costs that would be needed to serve and maintain that extension of the network. This means we only consider the capital costs associated with existing equipment in the JT network, and the operating costs associated with maintaining that network.
- Regarding demand, we only consider how the subscriber base will evolve within the current JT network footprint. In practice, this means that we exclude any growth in the subscriber base that would be generated from the take-up of services in new-build premises.[49]

In making this decision, we balanced the additional complexity that modelling new-build-premises would add to the model, with the benefits this would provide in terms of increases in model accuracy. Given that, we have taken this approach for three main reasons:

1. **The cost of serving an existing household is a reasonable proxy for the cost of serving a newly-built premise.** If anything, we would expect that the cost of serving a new premise to be lower relative to existing premises, as we expect new premises to either be in densely-populated new developments, or on spare land along existing roads covered by JT's network.[50] Our approach is therefore likely to be conservative, i.e. it results in a larger estimated cost-based price than if new-build premises where also considered in the model.
2. **The impact of modelling newly-build premises will be immaterial.** Even if the average cost of serving new-build premises was expected to be significantly

[49] More details on how this is done in practice is again provided in Section A.3 below.

[50] In both cases, the amount of network equipment that would need to be deployed for each new premise would likely be smaller than the average amount of equipment currently serving existing premises.

different to that of existing premises, this would only have a material impact on the estimated cost-based prices if substantial growth in premises in Jersey is expected. However, premise growth is expected to be small in Jersey over the coming years. For example, the Jersey Government forecasts that the number of private households in the jurisdiction will grow by less than 1.5% per year up to 2025, representing only 3,400 new premises over the 5-year price control period (compared to the current base of 47k households)[51]. Modelling the cost of serving these new households would therefore have little impact on the overall accuracy of the model.

3. **The approach is proportionate to the size of the jurisdiction.** This is because explicitly modelling the cost of new-build premises would add significant complexity to the model. For example, modelling the cost of these premises on a "bottom-up" basis would require developing geo-spatial data on the expected location of new premises, and then estimating the specific volumes of new network equipment that would be needed to extend the network to these premises. Similarly, modelling this on a "top-down" basis would require applying "uplifts" to each of the network and non-network cost items considered in the model, which would needed to be informed by data on how costs would be expected to change due to the extension in the network footprint.[52]

A.2.2 Cost scope

The categories of costs included in the cost model represent all activities and assets that support the provision of services on JT's FTTP network. This includes costs that are specific to the provision of individual services, included fixed voice services, as well as more "indirect costs" such a common costs (e.g. HR, Finance).

Given the choice of a top-down modelling approach, the specific categories of costs in the model were based on the cost categories within JT's financial accounts. These cover:

- Network capital costs; and
- Network and non-network operating costs.

Regarding network capital costs, JT's accounts provide the Gross Book Value (GBV) and Net Book Value (NBV) for each category of assets in their fixed and mobile networks.[53] From this, we identified the specific asset categories that support the provision of FTTP services, as summarised in the table below. These include the assets in:

- JT's access network ,i.e. from the Optical Network Terminal (ONT) at the end users premise up to and including the Optical Distribution Frame (ODF) and Optical Line Terminals (OLTs) in JT's exchanges, including passive infrastructure (duct, trenching, manholes);

[51] Jersey household projections 2016 release (projections under +1000 migration), see https://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20HouseholdProjections%2020161220%20SU.pdf

[52] The inputs and assumptions needed to implement either approach would also be difficult to inform using data from other countries, given that the dimensions of a network are inherently unique to the specific characteristics of that jurisdiction (e.g. the geographical characteristics of the jurisdiction).

[53] GBV represents the cumulative value of JTs assets as held in their accounts. The NBV is the gross value net of the amount of that gross value that has already been depreciated.

- JT's core and backhaul network, including core network links and routers as well as associated passive infrastructure;
- The "office building" asset class. We understand that this includes all of JT's buildings, including its exchange buildings as well as office buildings holding JT's network and non-network staff; and
- Voice-specific costs i.e. JTs IMS voice platform

Figure 11 Capital cost categories considered in the cost model

Part of network	Asset categories considered
FTTP access network	■ ONT ■ Drop cable ■ Fibre cable ■ FTTP Access Shelf – ODF ■ FTTP Access Shelf – OLT
Core and backhaul network	■ Core Router ■ 10G Core Link
Other	■ Duct/Trench/Manhole/JB (covering passive infrastructure in both the access and core/backhaul network) ■ Site infrastructure[54] ■ Office buildings ■ IMS Voice platform

Source: Frontier based on JT's accounts

Note: Asset category names reflect the names within JT's accounts

Regarding operating costs, JT's accounts also provide a breakdown of JT's network and non-network operating costs by specific cost categories. From this we again identified the categories that represent activities supporting the provision of FTTP services, which are summarised in the table below. The list of categories reflect an additional set of data shared by JT following the publication of the JCRA's Consultation, that we were not made aware of during engagement prior to the Consultation.

Figure 12 Operating cost categories considered in the cost model

Opex category	Description
Access Networks	Maintenance of fixed access network equipment, including, duct, manholes & joint boxes, serving both residential access products as well as Leased lines.
Infrastructure	Maintenance of backend site infrastructure such as electricity, network ironworks etc. This cost centre is responsible for exchanges, data centres and office and administrative buildings. Electricity costs are also included as part of the Non-Pay element of this cost centre.
IP Networks	Maintenance of the IP Core, primarily the Core routers, OLT equipment & OLO interconnection serving fixed network services. Also includes Cisco support & maintenance.

[54] This category includes the cost of assets such as generators and power equipment in JT's exchange buildings.

Opex category	Description
Core Networks	Team that previously looked after the Core Network. Responsibility has now transferred to the IP Networks team.
Software delivery	In house OSS support & development, focused heavily on the automation layer, access network & engineering resource planning applications, and provisioning tools.
Residential engineering	Fault repair and installation at customer premises – wholesale and retail.
Regulatory costs - Pay	Staff costs for supporting relationships with OLOs and account management.
Regulatory costs - Non pay	Cost of regulatory fees from both the JCRA & Spectrum fees from Ofcom, plus general regulatory overheads
IT	Maintenance & operation of corporate IT systems and applications. This cost centre serves all JT departments & all products.
IT BSS	Operational support for BSS platforms - primarily focused on the Billing system.
Customer Contact Centre	Contact centre & tier 1 support for residential customers.
Property management	Property management and repair across the JT property portfolio, including rent, leasehold expenses, and rates.
Common Costs	All indirect business costs not specifically related to services, such as Finance, HR, Legal.

Source: Frontier based on JT's accounts

Note: Opex category names reflect the names within JT's accounts

Additional costs associated with "High Risk Vendors" (HRVs)

As part of the modelling we also considered the need to include potential additional costs associated with assets from "High Risk Vendors" (HRVs). These vendors are those that have been deemed to be a potential security risk by the UK National Cyber Security Centre (NCSC). We understand that the Government of Jersey had signalled an intent to align its approach to HRVs to that of the UK, which would effectively mean banning the use of equipment from HRVs. As we understand JT's network includes some HRV equipment, this ban may therefore require JT to strip out and replace this equipment with equipment from other vendors, which would result in JT incurring additional costs.

We have not included an estimate of these costs within the cost model for the following reasons:

- It is not possible to estimate with any degree of accuracy the additional costs that JT may incur as a result of any policy regarding HRVs, nor the timing of the incurrence of those costs. This is because the Government of Jersey has not yet confirmed its policy regarding HRV equipment, and as part of that, the scope on any ban.
- Moreover, it is a policy decision whether these costs should be recovered from broadband customers (i.e. through prices charged to customers), or from Government (e.g. via a direct subsidy to JT). Only if it is decided that these costs should be recovered directly through broadband prices should these costs be included in the model.

Given this, a more prudent approach is to consider how these costs are accounted for when the relevant policy decisions are made.

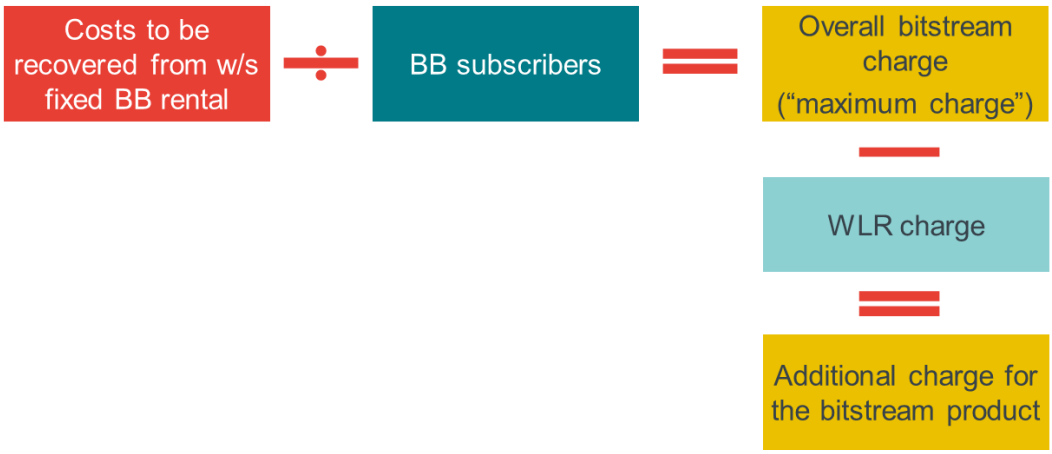
In the following sections we outline how the chosen scope and methodological approach has been implemented in practice. This provides an overview of the main calculations steps, and the key inputs and assumptions within those calculations.

A.3 Calculation steps and inputs – "fixed fee" pricing structure

As outlined above, under the "fixed fee" pricing structure the overall bitstream charge, or "maximum price", is a single monthly price per broadband subscriber in each year, made up of the WLR charge and an additional charge for the bitstream product.

To inform the overall bitstream charge, the model therefore calculates a monthly cost per broadband subscriber for the provision of wholesale broadband rental services in each calendar year from 2021 to 2026. This is done by identifying the appropriate costs to be recovered from these services in each year, and then divides this by the estimated number of broadband subscribers in those years. To calculate the additional charge for the bitstream product, the expected WLR charge is then netted off the unit cost. This ensures that the combined WLR and additional charge for bitstream reflects the unit cost of providing wholesale broadband rental services. The calendar year estimates are then "pro-rated" to 2021/22 to 2025/26 values to reflect that the charge control years run from October to September, using the approach described in Section A.1.

Figure 13 Overview of the overall bitstream charge and additional charge for the bitstream product



Source: Frontier

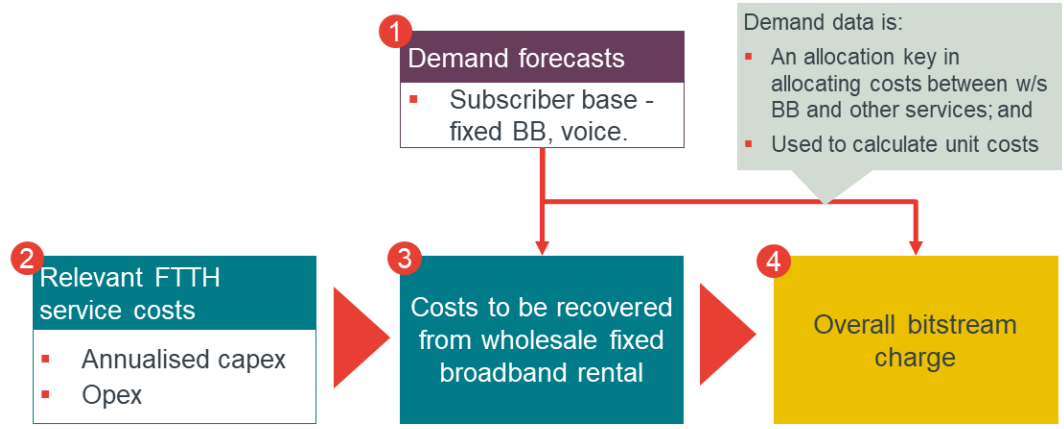
In practice, the model follows four main steps to estimate the overall bitstream charge in each calendar year, as illustrated in the diagram below.

1. **First, the model estimates demand on the JT FTTP network in each year over the modelling period.** This includes the number of broadband

subscribers on the JT FTTP network, but also fixed voice subscribers.[55] Subscriber numbers are estimated by applying subscriber growth assumptions to the current base of subscribers on the network.

2. **The annual capital and operating costs relevant to the FTTP network are then calculated.** For these the model uses the capital and operating costs in JT's accounts as a starting point. For capital costs, the model takes the GBV and NBV of JT's network assets, and converts these to current costs based on the average age of these assets and asset price trends. These costs are then annualised using either the RAB-type or tilted annuity approach, depending on the asset. For operating costs, the opex in JT's accounts is forecast forward based on assumed operating cost trends.
3. **The share of these costs to be recovered from wholesale fixed broadband rental services is then estimated.** This is done by "stripping out" costs that will be recovered from other services and other elements of wholesale broadband charges, using a set of "allocation keys". In particular, these keys strip out costs to be recovered from JT's mobile and retail services, other JT fixed services such as wholesale voice only services and leased lines, and wholesale broadband one-off charges.[56]
4. **The estimated overall bitstream charges are then calculated.** This is done by calculating the monthly wholesale fixed broadband rental cost per subscriber, by dividing the costs in each year from step 3 with the forecast broadband subscriber base from step 1 and converting into a monthly value. The WLR charge is then subtracted from this to obtain the estimated additional charge for the bitstream product.

Figure 14 Key calculation steps in the cost model



Source: Frontier

More details on steps 1 to 3 of the calculations is provided below.

[55] Subscriber numbers for fixed voice are used as the basis of allocating costs to these services in Step 3.

[56] OLOs face a separate one-off charges for activities such as customer connections, so the costs recovered through those charges should also be stripped out to avoid "double-counting" of costs.

A.3.1 Estimation of JT's subscriber base

As noted above, the calculation of cost-based prices requires forecasts of two sets of subscribers on the JT FTTP network over calendar years 2021-2026.

- Fixed broadband subscribers, including broadband only subscribers and those taking both broadband and fixed voice services.[57]
- Fixed voice only subscribers. These are subscribers who only take a fixed voice service on the JT network.

The broadband subscriber forecasts are used in step 4 of the calculations to estimate the unit costs, whilst both the broadband and voice only forecasts inform the allocation keys in step 3 of the calculations.

The model generates these forecasts by first estimating the "starting base" broadband and voice only subscribers on the JT network as of 2020, and then forecasting these forward by applying subscriber growth rates. The table below summarises the estimated starting base and the forecasts over 2021-2026.

For the "starting base", the model uses the latest broadband and voice only subscriber data from JT (subscriber numbers as of June 2020). A subset of broadband subscribers are then "re-allocated" from broadband to the voice only base, to reflect that a small number ([✂]) of broadband customers took up JT's offer of free broadband services during the COVID pandemic. This offer is only temporary and ended in December 2020, so it is reasonable to expect that a subset of those on this offer would cancel their broadband service once the offer was complete and return to taking only the voice only service. We assume that [✂]% of the [✂] subscribers would be expected to terminate their broadband service after December 2020, based on estimates provided by JT.

To develop the forecasts for 2021-2026, we first generate forecasts of broadband subscribers and the total number of access lines on the JT FTTP network (i.e. broadband plus voice only subscribers), by applying specific growth rates to these bases. The number of voice only lines is then estimated as the difference between these two values.[58] To inform the growth rates, we considered the expected change in subscriber numbers within the existing premises connected to the JT network, i.e. excluding any growth due to take-up in new-build premises.

- For fixed broadband subscribers, the model applies a growth rate of [✂]%. This rate reflects the broadband subscriber growth rate from November 2018 to November 2019 ([✂]%), net of the expected annual growth in premises in Jersey over 2021-2025 (1.4%). The subscriber growth rate for 2019 was used in order to exclude any increase in the rate of take-up during the COVID pandemic, which we assume would not be sustained beyond 2020.[59] The expected premise growth is then netted off to further exclude any growth

[57] We understand that currently, all customers taking a fixed broadband services also have a fixed voice services, meaning there are no broadband only subscribers.

[58] This continues to assume that all broadband subscribers will continue to take a voice line over the price control period. This is a reasonable assumption, given the past purchasing behaviours in Jersey.

[59] This is a conservative assumption i.e. if anything underestimates the potential growth in broadband subscribers, as it possible that the pandemic will have a lasting impact on the behaviour of consumers.

accounted for by take-up in new-build premises.[60] The expected growth rate reflects the State of Jersey's latest projections of private household growth for the period 2020-2025.[61] This results in an estimated fixed broadband base of [✂] by 2026, versus the starting base of [✂] in 2020.

- For total access lines, we assume that these will remain constant at 2020 levels until 2025. This is consistent with historical trends, where growth in fixed broadband subscribers on the JT network has offset the reduction in the number of voice only subscribers. This is a conservative assumption, as in general it is also reasonable to expect that the total number of access lines would at least remain stable over time.
- Together, this implies that the number of voice only subscriber on the JT network will fall by approximately 8.5% per year up to 2026, which is again consistent with historical trends in this base.

Figure 15 Fixed broadband and voice only subscribers on the JT FTTP network – starting base and forecast over 2021-2026

	Starting base (2020)	2021	2022	2023	2024	2025	2026
Fixed broadband *(including broadband and fixed voice bundles)*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Voice only	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total access lines (BB + voice only)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Frontier analysis

A.3.2 Calculation of annual costs

Capital costs

The second key step in the model calculations is the calculation of annual capital and operating costs over 2021-2026. To calculate annualised capital costs, the model calculations follow two overarching steps:

1. The value of assets in JT's accounts are first adjusted to calculate their value at current costs, and
2. They are then converted to annual costs using the appropriate annualisation approach.

As noted above, we apply a different approach for "legacy" and "newly-built" assets in JT's network, so we explain the specific approach for these two sets of assets separately below.

[60] This is again conservative, as the approach implicitly assumes that all new premises would take up a broadband service from JT.

[61] Jersey household projections 2016 release (projections under +1000 migration), see https://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20HouseholdProjections%2020161220%20SU.pdf

Approach for "legacy" assets

As outlined in Section A.1.4, "legacy" assets are those that were installed / built over a long period of time, have largely been depreciated, and which have now been "re-used" for the JT FTTP network. The specific JT asset classes that we have assigned to this category are "Duct/Trench/Manhole/JB", "Office buildings", and "Site infrastructure". For these assets, we apply a "Regulatory Asset Base" (RAB) approach.

The EC's 2013 Costing Recommendation sets out its view on the implementation of a RAB approach, which uses the value of the assets in an operators accounts as a starting point. In particular, the EC recommends that the approach be applied in the following way:

"the initial RAB… would be set at the regulatory accounting value, net of the accumulated depreciation at the time of calculation and indexed by an appropriate price index… The initial RAB would then be locked-in and rolled forward from one regulatory period to the next."[62]

We have implemented this approach in three main steps, based on the current GBV and NBV of the "Duct/Trench/Manhole/JB", "Office buildings", and "Site infrastructure" asset classes in JT's accounts:

1. The starting Gross Replacement Cost (GRC) and Net Replacement Cost (NRC) of the assets is first calculated based on the current GBV and NBV of the assets inflated by a price index and an assumed average asset age.
2. The annualised capital cost in the opening year, consisting of depreciation, a return on capital employed and holding gains/losses is then calculated based on the starting GRC and NRC.
3. The annualised capital cost is then forecasted forward for the period 2021-2026, based on the estimated evolution in GRC and NRC for each asset over time.

To calculate the starting GRC and NRC, we used the closing GBV and NBV for these assets for the year ending 31st December 2019, which is the latest available data from JTs financial accounts. [63] These were then converted to GRC and NRC as of 31st December 2019, based on the average age of the assets at that time and the assumed asset price trends. The average age for each assets were informed by data provided by JT, with the asset price trends informed by both JT data and price trends from in costs model used to inform wholesale broadband prices in other jurisdictions.

- For "Duct/Trench/Manhole/JB", the average age of the assets in this asset category as of December 2019 was six years, with the duct asset prices assumed to have increased by ~[✂]% per year over this period. The GRC and NRC were therefore calculated by applying six years of inflation to the GBV and NBV at a ~[✂]% inflation rate.

[62] Paragraphs 37 and 38, EC 2013 Costing Recommendation.

[63] For the NBV, we use the average NBV as of December 2019 and December 2018, to estimate the average NBV throughout the year (or Mean Capital Employed). This is because in calculating the annualisation of costs outlined below, the capital charge element should be calculated as the WACC multiplied by the MCE. The exception to this is for "Site infrastructure" where JT only provided its NBV as of December 2019. For this we assume the average NBV in 2019 is the same as the year end value.

- For “Office buildings”, we understand that these assets are already valued at current costs within JT’s accounts, meaning the GBV and NBV already represent the GRC and NRC of the assets. No adjustment was therefore made for these assets.

From the GRC and NRC values, we then calculated the annual capital cost of the assets for 2019. This was done using a straight-line depreciation approach, consistent with the approach in JT’s accounts. An adjustment is also made for holding gains and losses, resulting from expected changes in the value of the assets in future. The annual capital cost is therefore made up of three components, as shown in the formula below.

As shown in the formula, if the price of an asset is expected to increase over time, the holding gain/loss adjustment represents a downward adjustment to the annual charge. This is to reflect the fact that JT will benefit from the increase in the value of the asset over time (i.e. a holding gain). As explained in Section 3, this adjustment ensures that an increase (or decrease) in the value of the assets over time does not result in an over (under) recovery in costs.

Figure 16 Annual capital charge formula – “legacy” assets

$$\text{Annual charge} = \text{Annual depreciation} + \text{Capital charge} - \text{holding gain / loss adjustment}$$
$$= (\text{GRC/asset lifetime}) + (\text{NRC*WACC}) - (\text{NRC*\% annual future asset price trend})$$

Source: Frontier

Finally, the annual capital cost for 2019 was forecasted forward to estimate the appropriate annual capital cost for the years 2021-2026. To do this, the 2019 annual cost is indexed using the expected future changes in prices for each asset over time.

- This approach implicitly assumes that the GRC and NRC of each asset will also change over time in-line with the expected trend in the underlying asset prices.
- This is a reasonable approximation when a network is in a “steady state” i.e. when the footprint of a network remains the same, and investments are just made to replace existing assets in the network once they reach the end of their useful life. This is the case for JT, given the network scope that we have considered in the model i.e. we only model the costs of the existing JT network without any expansion due to premise growth.

Approach for “newly-built” assets

All of the other asset classes in the model are categorised as “newly-built” assets i.e. assets that were installed recently, such as equipment installed or upgraded as part of JT’s FTTP roll-out. For these assets, capital charges are calculated using a tilted annuity approach, which “tilts” the recovery of costs based on the expected trend in asset value over time. As outlined in Section A.1.4, given these assets were relatively recently installed, this approach provides a more stable forward looking cost recovery profile than a RAB-style approach. The application of asset price tilts also results in an efficient profile of cost recovery for these assets, as it ensures that more costs are recovered in periods when the replacement cost of the asset is higher.

To implement this approach, we first estimate the Gross Replacement Cost as of December 2019. This is calculated in the same way as for "legacy" assets, based on the average age and assumed trends in asset prices for each of the asset classes.

Second, annual capital costs are calculated by applying the "tilted annuity" annualisation approach.

- The standard annuity approach identifies a single annual charge which, if received in each year over the lifetime of the asset, would allow JT to recover the GRC of the asset plus the associated financing costs based on an appropriate WACC.
- The tilted annuity then applies a tilt to this single annual charge, so that the charge is larger in years when the replacement cost for the asset is expected to be higher, and lower when replacement costs are lower.

In practice, the annual charge for each asset in 2019 is first calculated using the tilted annuity formula, which uses the GRC of the asset and expected future trends in asset prices. The annual charges for the years up to 2026 are then calculated by indexing the 2019 value based on the asset price trend. The specific formulas for the calculation are set out below:

Figure 17 Calculation of annual capital costs – "newly-built" assets

$$Annual\ charge\ (2019) = GRC(2019)\ x\ \frac{WACC - p}{1 - \left(\frac{1+p}{1+WACC}\right)^{asset\ lifetime}}$$

$$Annual\ charge\ (2019+t) = Annual\ charge\ (2019)\ x\ (1+p)^{t}$$

Where: p = annual % trend in asset price for the particular asset

Source: Frontier

Value of inputs in the calculations

As shown in the calculation steps above, there are five key sets of inputs that feed into the annual capital cost calculations for "legacy" and "newly-built" assets:

- The GBV and NBV of JT assets as of December 2019 for each asset category;
- Average age of assets as of December 2019 for each asset category;
- The expected economic lifetime for assets in each asset category;
- Annual assumed % change in asset prices for each asset category; and
- The appropriate WACC for JT.

As noted above, the data on GBV and NBV for each asset is taken from JT's latest available accounts.

Regarding the average age, expected lifetime, and trend in asset prices for each asset category, the table below summarises the values used in the cost model:

- As noted in the approach for legacy assets above, the average age for each assets were informed by data provided by JT.

- Regarding the economic lifetime of each asset, these were informed from international precedent on asset lives from recent NGA cost models built in European jurisdictions, including the UK, Belgium, Ireland and Sweden. From this we assume long asset lives for ducts/trenching, cabling, buildings, and ODFs, and shorter lifetimes for active equipment (ONT, OLT, Core Routers, and the IMS Voice platform).
- Regarding the asset price trends, these were informed by both JT data and international precedent on asset price trends from recent NGA cost models, using nominal prices trends from these models.[64] From these, we expect that asset prices for duct/trenching and OLTs will increase over time, and a reduction over time for cabling and active equipment. For the trend in "office building" assets, this was informed by the historic growth in private house prices in Jersey. In particular, we use the house price index produced by Statistics Jersey, which estimates that house prices grew by approximately 4.1% between 2010 and 2020.[65]

Figure 18 Key asset inputs – calculation of annual capital costs

	Economic lifetime (years)	Average age of asset (years)	Annual trend in asset prices - historic (%/yr)	Annual trend in asset prices - future (%/yr)
Duct/Trench	40	[✂]	[✂]%	2.50%
Office buildings	40	[✂]	[✂]%	4.07%
Site infrastructure	15	[✂]	[✂]%	0.00%
ONT	5	[✂]	[✂]%	-8.00%
ODF	25	[✂]	[✂]%	1.00%
OLT	7	[✂]	[✂]%	-8.00%
Drop cable	25	[✂]	[✂]%	-2.00%
Fibre cable	25	[✂]	[✂]%	-2.00%
10G Core Link	20	[✂]	[✂]%	-2.00%
Core Router	7	[✂]	[✂]%	-8.00%
IMS Voice platform	5	[✂]	[✂]%	-8.00%

Source: Frontier

Notes: Historic trends for office buildings and the IMS Voice platform are not needed, as we understand the assets in these categories are already valued at current value in JT's accounts

Finally, for the WACC, the model uses a pre-tax nominal WACC of 8.7%. This has been estimated based on our assessment of JT's estimate of its current WACC in

[64] For future price trends we rely solely on international precedent, and for historic trends, use both international precedent and JT's data, but put more weight on the former. This is because the objective of the model is to estimate the efficient level of costs, and therefore, the cost trends used should represent the expected trends in costs which would be faced by an efficient operator. We would expect price trends used in other NGA models to reflect the efficient evolution of costs, given those models also aim to model the cost of an efficient operator, We note however that the price trends suggested by JT's data do not follow the trends seen in these cost models. We therefore think that informing trends using other models is likely to better reflect the efficient evolution of costs.

[65] See https://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20House%20Price%20Index%20Q3%202020%2020201119%20SJ.pdf

its submission to the JCRA in December 2020, and on responses to the JCRA's Consultation. More detail on this assessment is provided in Annex B.

Estimated annual capital costs for 2021-2026

The table below summarises the estimated annual capital costs for each asset over calendar years 2021-2026, based on the calculations and inputs outlined above. Overall, the annual capital costs fall marginally over the price control period.

- The annual costs for duct/trench, office building and ODFs increase over time, reflecting the expected growth in the prices for these assets.
- This is however offset by the reduction in annual costs for cabling and active equipment, where asset prices are expected to fall over time.

Figure 19 Estimated annual capital costs for 2021-2026 (£000s)

		2021	2022	2023	2024	2025	2026
Duct/Trench	Legacy	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Office buildings	Legacy	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Site infrastructure	Legacy	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
ONT	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
ODF	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
OLT	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Drop cable	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Fibre cable	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
10G Core Link	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Core Router	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
IMS Voice Platform	Newly-built	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total		**[✂]**	**[✂]**	**[✂]**	**[✂]**	**[✂]**	**[✂]**

Source: Frontier

Operating costs

To estimate total annual costs over 2021-2026, we also estimate the total operating costs for each year over this period.

To do this, we use data on JT's current annual operating costs for the considered opex categories as a starting point, and forecast this forward based on the expected trend in operating costs over time.

Regarding JT current operating costs, we use as a starting point the average of the annual costs for each category for the years ending December 2017 to December 2020, from JT's financial accounts. We use an average over multiple years, rather than the values for the latest year, for the following reasons:

- JT's operating costs vary year-on-year within each category, meaning costs in an individual year are unlikely to be representative of an "average year".

- Taking an average over a larger number of years is likely to be more accurate than over two or three years, as it means the estimate is less impacted by specific one-off events that impact costs in a given year.

Regarding the expected trends in operating costs over time, we then assume that operating costs will remain largely stable over 2020 to 2026. This value reflects expected inflation over this period, net of gains in efficiency over this period.

- Annual inflation is estimated to by 2.4% over the period. This assumes that the inflation rate will reflect the historic RPI rate over 2015 to 2020.[66]
- Regarding efficiency gains, we assume that JT is able to make efficiency gains of 2.5% per year over this period.

To determine the 2.5% efficiency gain estimate, we considered three main sources of data:

- Ofcom's estimate of achievable efficiency gains for Openreach's fixed network pay and non-pay operating costs, which was used in its Regulatory Asset Base (RAB) model developed as part of its 2020 WFTMR Decision[67], of 4.5%;
- Ofcom's FTTP model developed as part of the same WFTMR Decision.[68] Ofcom explicitly assumes annual efficiency gains of 3% for Service Level Guarantee (SLG), and system and processing costs[69], as well as further gains of up to 1.5% for other elements of opex including repair and maintenance, power, and general management costs.[70] Efficiency gains are also considered on some elements of capital costs; and
- Estimates of Multifactor Productivity (MFP) produced by the UK Office of National Statistics (ONS), that were provided by JT as part of its response to the JCRA's Consultation. The MFP measures provide an estimate of the annual efficiency gain for the UK economy as a whole, as well as for individual sectors.[71] JT specifically pointed to the UK-wide measure (of 0.7%) and a measure based on a combination of sectors including Information and Communications, Electricity, Water, and Admin and support services (estimate of 0.3%).[72]

Regarding Ofcom's efficiency gain estimate of 4.5%, we consider this to represent an upper bound of the potential efficiency gains on the JT network, given the efficiencies estimate is based on Openreach's copper network, where there is likely

66 This was calculated using the RPI index from the Jersey Government opendata database. https://opendata.gov.je/dataset/rpi-rpi-x-rpi-y-rpi-pensioners-and-rpi-low-income-percentage-changes/resource/0501a918-9e04-4e82-b2f5-87568109660b

67 See https://www.ofcom.org.uk/__data/assets/pdf_file/0031/188923/wftmr-annexes-1-23.pdf

68 See https://www.ofcom.org.uk/consultations-and-statements/category-1/2021-26-wholesale-fixed-telecoms-market-review

69 These costs represent costs faced by the network provider when it fails its service level guarantees, and costs associated with processing and recording new orders.

70 These operating costs are calculated as a percentage of Gross Replacement Costs (GRC), and Ofcom considers annual efficiency gains of 1.5% to the GRC for Ducts and associated Civils, which is an important element of JT's FTTP network.

71 See https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/multifactorproductivityexperimentalestimatesreferencetables

72 Both estimates reflect the MPF over the full ONS data set, which covers the 25 years to 2019.

to be scope for greater efficiencies than on a newer FTTP network such as that of JT.

Conversely, we consider that the MFP estimates of 0.7% and 0.3% presented by JT would underestimate the potential JT efficiencies. In particular, it is reasonable to expect the fixed telecoms sector to have greater scope for efficiencies than the "average" sector, given fixed networks have evolved significantly over the past decades through technological advancement.[73] Similarly, you would expect that sectors such as the Water sector, which feed into the 0.3% estimate highlighted by JT, to have significantly less scope for efficiencies than fixed telecoms, as the technology used in that industry has remained largely unchanged for a number of years.[74]

On balance, we consider than an efficiency gain of 2.5% per annum is a suitable estimate, which sits around the mid-point of Ofcom's 4.5% estimate and the MPF estimates put forward by JT.

A.3.3 Allocation of costs to wholesale broadband rental services

Having estimated the annual capital and operating costs for the considered cost categories, the next step is to identify the share of these costs that should be recovered from wholesale broadband rental services. As noted above, this is required because a number of the assets and activities within the considered cost categorises support the provision of a range of other services, meaning that a share of these costs should also be recovered from those services.

In particular, the costs to be recovered from wholesale broadband rental services are identified based on the following overarching approach:

- First, costs are allocated between JT's FTTP network and services offered over JT's mobile network.
- Second, costs relating purely to JT's fixed retail services are stripped out. The remaining costs are those that should be recovered through wholesale services on JT's FTTP network
- These costs are then allocated between wholesale broadband services and other services offered on the JT FTTP network i.e. voice only and leased line services. These services use the same network equipment as wholesale broadband services, including the fibre access cabling and equipment, so need to be allocated a share of these costs.
- Finally, a share of the costs relating to wholesale broadband services are allocated to other one-off wholesale charges, such as connection charges.

The resulting costs are then the costs recovered from wholesale broadband rental services.

[73] This is evident in the development of network technologies (such as FTTC, FTTP, and DOCSIS), and the fact that fixed network equipment has become increasingly more efficient over time (the ongoing operating costs of FTTP equipment are significantly lower than operating costs of copper network equipment, due to higher resilience and better energy efficiency).

[74] This is supported by the MPF estimate for the Information and Communications Sector, which, while covering other industries such as publishing, TV/sound/music recording, broadcasting and computer programming as well as Telecoms, suggests an annual efficiency gain of 2.4%.

The specific implementation of the approach for operating and capital costs is set out below.

Operating costs

For operating costs, the cost allocation is done in two steps within the model:

- **First, specific elements of costs that relate directly to JT's mobile network and retail activities are stripped from the cost base.** This includes "property management" costs relating to mobile network and retail buildings (such as mobile mast rental and property costs on JT retail stores), electricity and power costs on mobile mast sites (within the "Infrastructure" category), and JT fees such as Spectrum fees paid to Ofcom to support mobile services (in the "Regulatory Non-Pay" category).
- **Second, a share of the remaining costs are allocated to wholesale broadband rental services using a set of "allocation keys".** These keys vary depending on the specific operating cost category, as summarised in the table below. These allocation keys were initially developed by JT and then refined by Frontier, following a detailed review of the nature of the activities underlying each cost category.

Figure 20 Allocation keys for allocating "remaining" operating costs to wholesale broadband rental services

Opex category	Allocation key	% allocation
Access Networks	JT broadband and voice lines as a % of total fixed lines on the JT network (including leased lines).	[✂]%
Infrastructure	JT wholesale broadband revenues in Jersey as a % of JT total Jersey revenues.	[✂]%
IP Networks	2 stage allocation: ▪ Allocation to fixed vs mobile network: % Core routers used for fixed services. ▪ Allocation of fixed network costs to broadband and voice: Share of JT OLT ports used for JT broadband and voice services.	[✂]%
Core Networks	No costs allocated *(all relevant costs covered in the IP Networks cost category).*	[✂]%
Software delivery	JT wholesale broadband revenues in Jersey as a % of JT total Channel Island revenues.	[✂]%
Residential engineering	All costs allocated to wholesale broadband and voice.[75]	[✂]%
Regulatory costs - Pay	2 stage allocation: ▪ Exclusion of 1/6 of staff member costs, whose activities are unrelated to wholesale broadband and voice services. ▪ 90% of the remaining costs allocated to wholesale broadband and voice rental (10% recovered through one-off charges).	[✂]%

[75] For leased lines, we understand that the cost of all activities at the customer's premises is borne by the customer. For broadband and voice services, an immaterial share of costs relates to JT retail activities at

Opex category	Allocation key	% allocation
Regulatory costs - Non pay	JT BB share of Relevant turnover used to set fees paid to the JCRA.[76]	[✂]%
IT	JT wholesale broadband revenues in Jersey as a % of JT total Channel Island revenues.	[✂]%
IT BSS	JT wholesale broadband revenues in Jersey as a % of JT total Channel Island revenues.	[✂]%
Customer Contact Centre	% share of calls to JT's call centre relating to FTTP network faults (vs FTTP retail sales and mobile-related calls).	[✂]%
Property management	% allocation of JT building space occupied by equipment supporting JT wholesale broadband and voice services.	[✂]%
Common Costs	JT wholesale broadband revenues in Jersey as a % of JT total Channel Island revenues.	[✂]%

Source: JT and Frontier, based on detailed review of activities underlying each cost category

Capital costs

For capital costs, the cost allocation is again conducted in two steps:

- **First, a share of capital costs for the "10G Core Links" and "Core Routers" asset classes is assigned to mobile services.** This is because these links and routers also provide capacity for JT's mobile services. 17% of these costs are allocated to mobile services, reflecting the share of JT 10G core router ports used for mobile vs FTTP.
- **Second, a share of the remaining FTTP costs are allocated to leased line services.** We note that specific cost information to inform this allocation is not available from JT's accounts. This allocation was therefore informed from the share of Openreach's costs in the UK that relates to these services, which we estimate at 14%. This was done by calculating the annualised cost of Openreach services in the Business Connectivity Market based on its 2020 Regulatory Financial Statements, and dividing this by the total annualised costs across all Openreach services. We take a conservative assumption in the model and assume 10% of JT's FTTP costs should be recovered through Leased Line services.

A slightly different approach is considered for "Office Building" and "Site infrastructure" capital costs, where a certain percentage of these costs are allocated directly to wholesale broadband rental services. This is to ensure the chosen allocation is consistent with the allocation approach used for their "equivalent" operating cost categories:

- For "office building" costs, the % allocation is equivalent to the allocation of "Property management" operating costs. This % allocation reflects the exclusion of costs relating directly to mobile and JT retail services, as well as

the premises, as we understand that the vast majority of JT retail routers are installed by the customer themselves ("plug-in" routers that are sent to the customer in the mail).

[76] After stripping out mobile-related payments to Ofcom, the majority of the remaining costs in the regulatory non-pay costs category related to fees paid to the JCRA.

the occupancy rate allocation key used to allocate the remaining costs to wholesale broadband rental.[77] This results in an overall allocation of [✂]%.

- For "site infrastructure" costs, the allocation is equivalent to the allocation for "Infrastructure" operating costs. The % allocation again reflects the two-part allocation of those operating costs i.e. the exclusion of specific costs relating to electricity and power for mobile masts, and the revenue share allocation key used to allocate the remaining costs to wholesale broadband rental.

Allocation of costs to voice only customers

The allocation keys outlined above do not allocate a share of costs to JT's wholesale voice only services. These costs therefore also need to be stripped out to avoid over-recovery of costs from the overall bitstream charge. Costs are allocated to voice only services based on JT's wholesale price for voice only services, which is the price of its Wholesale Line Rental (WLR) service. This approach is reasonable, as the wholesale price represents the amount of costs that JT could expect to recover from those services. In practice, we assume that the WLR charge will remain at £11.10/subscriber/month over the price control period.[78] This is then converted to an annual figure and multiplied by the estimated number of voice only subscribers on the JT FTTP network in each year of the price control period.

Total annual costs recovered through wholesale broadband rental services

The table below summarises the estimated annual costs to be recovered from wholesale broadband access rental services in each calendar year over 2021-2026, based on the cost allocation approach explained above. Consistent with the trends in capital costs and operating costs outlined in Sections A.3.2 above, the total estimated annual costs decline gradually in each year over the price control period.

Figure 21 Estimated annual costs to be recovered from wholesale fixed broadband rental services for 2021-2026 (£000s)

	2021	2022	2023	2024	2025	2026
Total annual costs	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Frontier

[77] The "property management" opex allocation key is a reasonable proxy for the appropriate allocation for the "office building" asset class, as it is reasonable to expect that the operating costs of buildings are strongly related to the value of the buildings. This is consistent with the approach used in cost models developed by NRAs in other jurisdictions, where operating costs are often estimated as a % mark-up on the value of assets. The approach is also consistent with the views put forward by JT, who suggested that the same allocation key could be used for both office building capital costs and property management costs.

[78] We note the WLR price has remained unchanged in recent years.

ANNEX B HIGH-LEVEL ASSESSMENT OF JT'S COST OF CAPITAL

B.1 Framework

The approach to determining the appropriate return to be applied to JT needs to take account of the particular circumstances of Jersey:

- JT is wholly owned by the Jersey Government which may affect the cost of funding JT, both external funding such as debt issues by JT and the cost of funds provided by the Jersey Government as a shareholder;
- The Jersey Government as shareholder, can take account of broader policy objectives when making decisions on investments, whereas private investors will focus on maximising their returns;
- JT has fully rolled out a fibre network in advance of other jurisdictions (presumably in part due to Government ownership); and
- There is no expectation that other operators owned by private investors will roll out competing infrastructure based networks.

This means that some of the considerations taken into account by regulators in other jurisdictions do not apply here:

- There is less need to 'aim up' when setting the return to ensure private investors are suitably incentivised to make socially optimal investments; and
- There is less need to proxy private investors cost of capital to send appropriate build or buy decision to potential investors in alternative infrastructure, given the Jersey Government's focus on maximising service-based competition rather than network-based competition.

The JCRA has previously set regulated prices for JT based on a weighted average cost of capital (WACC) estimate as if it were a privately owned business and JT has submitted an estimate of its required return based on a WACC for private investors.

In view of this precedent we propose to use a WACC approach to set the required return.

Note that this annex outlines previous WACC determinations, JT's submission on WACC made in advance of the Consultation process, and the adjustments that we made to that to inform the WACC estimate used for the purposes of the JCRA's Draft Decision. We note that we have not adjusted these estimates for the purposes of the cost model used to inform the JCRA's Final Decision. The rationale for that is set out within that Final Decision.

B.2 Previous WACC determinations

The WACC was last determined in 2008, using the Capital Asset Pricing Model (CAPM), which is a standard approach to determining the cost of capital. More specifically, the WACC combines the cost of funding from debt (*Kd*) and equity (*Ke*), each weighted by their relative share of enterprise value (i.e. the sum of the

value of debt and equity). The value of outstanding debt relative to enterprise value (gearing) is denoted by *g* in the WACC formula below and the rate of corporation tax is denoted by *t*.

$$WACC = \frac{Ke * (1 - g)}{1 - t} + Kd * g$$

In 2008, the JCRA set JT's WACC at 11.6% (nominal pre-tax).

However, since 2008 many of the parameters that influence WACC have changed, in particular risk-free rates have declined significantly. This has led a reduction in telecoms operators' cost of capital. For example, in 2009, Ofcom set Openreach's WACC at 10.1% (nominal pre-tax)[79]; however, by 2019, it was reduced to 7.1%.[80]

More generally, we observe that national regulators re-assess regulated companies' WACC periodically (every 2-5 years).

In light of the above, it is appropriate to re-assess JT's cost of capital. The JCRA requested JT to provide its own assessment of its WACC. In the remainder of this annex, we first summarise JT's proposal, followed by our comments on the key parameters. This result of this assessment is a recommended WACC of 8.7%[81], which has been used in the cost model.

B.3 JT's submission

JT commissioned PWC to assess JT's cost of capital. PWC's report "JT's Cost of Capital Assessment" was submitted to the JCRA on December 2nd 2020. PWC in its submission notes that there is inherent uncertainty involved in estimating WACC components and, to reflect that uncertainty, PWC has produced a range values between 7.6% (Lower bound) and 11.5% (Upper bound).

PWC's proposed parameter values and justifications for these values are summarised in Figure 22 below.

79 https://www.ofcom.org.uk/__data/assets/pdf_file/0018/53730/statement.pdf

80 https://www.ofcom.org.uk/__data/assets/pdf_file/0028/154594/pimr-bcmr-llcc-final-statement-annexes-1-25.pdf

81 In principle, regulators may determine WACC separately for SMP operators' Wholesale business and Retail business, as is the case for BT in the UK. We do not propose to do it in this case, as it would be disproportionate for a small jurisdiction.

Figure 22 PWC's assessment of JT's WACC

Table 1.1: Summary of the WACC for JT (Jersey) Limited in nominal terms

Component	Calculation	Low	High	Comments
Gearing	A	40.0%	55.0%	Low end based on comparators; high end based on historical analysis of JT capital structure
Risk free rate	B	0.80%	1.15%	Low end based on UK government debt and high end based on AAA-rated corporate debt
Total market return	C	8.2%	9.4%	Aligned to UK regulators
Equity market return premium	D = C - B	7.40%	8.25%	Derived using TMR and risk-free rate
Asset beta	E	0.55	0.70	Based on econometric analysis and considering the impact of Covid-19
Debt beta	F	0.15	0.04	Based on regulatory precedent
Equity beta	G = (E - (A * F)) / (1 - A)	0.82	1.51	
Small company premium - Equity	H	0.90%	2.25%	Low end based on the small company premium used in JT's 2003 and 2008 cost of capital. High end is the midpoint between the low end and the Small Cap Premium according to Duff & Phelps.
Cost of equity	I = B + G * D + H	7.7%	15.8%	
Benchmark cost of debt	J	4.50%	4.50%	Based on the interest rate JT is currently paying on its private placement
Issuance and liquidity costs	K	0.10%	0.20%	Based on regulatory precedent
Cost of debt	L = J + K	4.60%	4.70%	
Tax rate	M	20%	20%	Based on Jersey corporate tax rate
Nominal pre-tax WACC	**N = (I / (1 - M)) * (1 - A) + (A * L)**	**7.6%**	**11.5%**	
Point estimate (67th percentile)		**10.2%**		

Source: PwC analysis

PWC recommends setting JT's WACC towards the upper end of the range due to the following reasons:

- The asymmetrical risks associated with setting WACC too low as "*the economic and social costs of underinvestment are greater than the costs of overinvestment*";
- The fact that JT has invested in an island-wide point-to-point fibre network, which does not have many precedents in other jurisdictions. PWC argues that the existing benchmarks might not be representative of the risks faced by JT and consequently its WACC may be higher than suggested by the benchmarks.

As a result, PWC recommends setting JT's WACC at the 67th percentile of the range, at 10.2%.

For a comparison, setting WACC at the mid-point of the estimated range would result in the cost of capital of 9.6%.

B.4 Our assessment of JT's submission

We broadly agree with PWC's assessment of a number of the parameters of the CAPM model. However, we note that for some of the parameters, PWC has taken a conservative approach and excluded some of the lower benchmarks.

For example, for asset betas, the proposed range is between 0.55 and 0.7. However, based on the evidence presented in PWC submission, 37% of the observations in the sample are below 0.55. Taking the excluded observations into account, a more representative range would be between 0.45 and 0.7.

In this case, we do not propose to adjust the range for asset betas. However, we note this generally conservative approach implies that 'aiming up', i.e. choosing the point estimate towards to the upper end of the range, is not appropriate as the range itself is chosen conservatively. We further discuss the issues of 'aiming up' below.

In addition, there are two parameters where the range prosed by PWC is not sufficiently justified. These are:

4. small operator equity premium; and
5. cost of debt.

We discuss these parameters in turn below.

B.4.1 Small operator equity premium

PWC argues that JT is a small operator by international standards and that "*investors that allocate capital to small companies are exposed to additional risks, such as illiquidity and lack of product and geographic diversification risks. In this case, investors would expect a higher return (premia) to compensate them for taking on greater risk*".

PWC uses the evidence from past regulatory determinations by Ofwat (PR09 and PR14) and by Ofgem (2002), and recommends to apply a small operator equity premium ranging between 0.9% (lower bound) and 2.5% (upper bound).

We observe that in the regulatory precedents cited in the report, the premia applied by the regulators were lower than proposed by PWC (0 – 0.9%). Moreover, some of the cited precedents refer to the uplift to the cost of debt rather than to the cost of equity (e.g. the PR19 CMA appeal and the PR14).

We further observe that in recent regulatory decisions Ofwat questioned the existence of a small operator equity premium. In its report for Ofwat, PWC itself stated the following:

"*the academic view, which has now prevailed for a number of years, is that there is significant doubt on whether a small company effect exists. A comprehensive 2011 study that reviewed size effects in equity returns reinforced this doubt, concluding that, on the basis of decades of empirical research, there is not a persuasive answer on whether size is responsible for stock returns*[82]*. This inconclusiveness in the literature confirms the views of Ofwat and the CC that there*

[82] Mathijs A. van Dijk (2011) Is size dead? A review of the size effect in equity returns, *Journal of Banking & Finance*, Volume 35, Issue 12, December 2011

is insufficient evidence for an uplift based purely on the basis of size."[83] (emphasis added).

Consequently, no small operator equity uplift was applied to water companies in PR14 and PR19[84].

We disagree with PWC that a higher equity premium should apply to JT as "*JT is a very small company compared to typical regulated firms*", and therefore faces additional risks. Given that JT is publicly-owned and does not face any network competition, its risks are lower than those of private firm operating in a competitive environment.

In light of the above, we adjust the small operator equity premium to line with the regulatory precedents and use a range between 0% (based on recent decisions in the UK) and 0.9% (based on historic precedents).

B.4.2 Cost of debt

In its assessment, PWC proposes to use the cost of JT's existing ('embedded') debt. In 2012, JT borrowed £51m in two tranches; the first tranche (£31m) expired in 2019 and the second tranche is expiring in 2022. The interest paid on the second tranche is 4.48%.

When forming a view on the appropriate cost of debt, regulators typically consider both the cost of embedded debt and also a forward-looking cost of debt. For example, in the latest assessment of WACC for BT, Ofcom estimated a forward-looking cost of debt of 2.9% and weighted the cost of new and existing debt, which resulted in a range of estimates between 3.5% and 4.5%.[85]

We propose to use a similar approach and take a weighted average of JT's existing and forward-looking cost of debt.

For the forward-looking cost of debt we rely on recent regulatory precedents:

- Ofcom's estimate of the cost of new debt for BT – 2.9%;[86]
- Ofwat's estimate of the cost of new debt for water companies - 3.36% (central estimate of the range 3.2%- 3.57%).[87]

Taking the higher of the two estimates (3.36%) as a proxy of the cost of new debt for JT and weighing the cost of new and existing debt based on the expiration debt of the existing debt (60% : 40%), we estimate the cost of debt for JT to be 3.8%. We use this estimate as the lower bound of the range, keeping the upper bound at its current level of 4.5%.

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83 PWC (2014) "Company specific adjustments to the WACC A report prepared for Ofwat" https://www.ofwat.gov.uk/wp-content/uploads/2015/10/rpt_com1408pwcuplift.pdf

84 We note that Ofwat applied a small operator premium to the cost of debt. This is discussed in the section on cost of debt below.

85 Ofcom (2019) "PIMR and BCMR statement: annexes 1-25" https://www.ofcom.org.uk/__data/assets/pdf_file/0028/154594/pimr-bcmr-llcc-final-statement-annexes-1-25.pdf

86 Ibid

87 https://www.ofwat.gov.uk/wp-content/uploads/2019/07/PR19-draft-determinations-Cost-of-capital-technical-appendix.pdf

Overall, this is a conservative approach. PWC in its own submission acknowledges that "*JT's cost of embedded debt is above the current yields available on fixed income indices, such as the iBoxx A/BBB index which is commonly used for regulatory determinations*." PWC attributes this difference to specific risks related to small companies.

However, comparing JT's cost of existing debt with the iBoxx A/BBB Index in 2012 (at the point of borrowing), we observe that the two were closely aligned. This comparison does not provide any evidence of JT paying a premium over the yields that prevailed at the time.

We consider that PWC's proposed approach of relying exclusively on the cost of JT's existing debt is inconsistent with the approaches taken by other regulators, in particular by Ofcom. Given that JT's existing debt expires in 2022, it is appropriate to form a view on the cost of JT's future borrowing. JT's submission effectively implies that JT's cost of borrowing would remain at the same level as it was in 2012. This, however, is inconsistent with the observed trends, as the cost of borrowing has declined significantly since 2012. Therefore, PWC's proposed approach overstates the cost of debt over the next 5 year.

The choice of the point estimate

PWC proposed to 'aim up', i.e. to set WACC closer to the upper end of the range, due to uncertainty and the risk to future investment if WACC is set too low. PWC further argues that JT's investment in ubiquitous P2P FTTP network increases its operational leverage and makes JT more exposed to cyclicality than other comparator companies. This justifies a higher WACC.

We disagree with PWC that setting WACC at 67th percentile is appropriate in this case in order to ensure socially optimal investment for the following reasons:

- PWC's estimates for some parameters have been constructed conservatively (i.e. lower bound estimates have been excluded). This implies that the mid-point for WACC also represents a conservative estimate. Alternatively, one could extend the range for the underlying parameters to include the lower bound estimates (which are currently being excluded). In that case, it may be more appropriate to set WACC at the 67th percentile. However, it would also likely to result in a lower WACC estimate overall.
- As discussed above, the regulated products in Jersey are largely non-contestable (i.e. there is no prospect of network competition). Therefore, we use a RAB approach rather than set costs based on a forward looking LRIC+ basis. As such, the determined WACC applied to the asset base should not affect other operators' incentives to invest.
- While JT may have relatively high operational gearing, the lack of infrastructure based competition and regulation on a RAB basis should reduce systematic risk compared to some other comparators.

With the adjustments proposed above, our range of estimates for JT's WACC is between 6.7% and 10.7%. We recommend setting WACC at the mid-point of the range, i.e. at 8.7%.

ANNEX C COST MODELLING CHANGES FOLLOWING THE JCRA'S CONSULTATION

As a result of responses to the JCRA's Consultation, some changes were made to the modelling approach, input data, and model assumptions within the cost model used to develop the proposed overall bitstream charges. These changes relate to operating and capital costs. The changes are set out in the table below, and are reflected in the main body and Annex A of this report. Further detail on the responses to the Consultation and the JCRA's position on these is provided in the JCRA's Final Decision.

Figure 23 Cost modelling changes following the JCRA's Consultation

Model element	Revision to approach in cost model developed for the Consultation	Driver of change
Capital costs		
Asset classes considered	Addition of "Site Infrastructure" asset class.	Additional data provided by JT following the JCRA's Consultation.
Categorisation of asset classes for annualisation approach	"Legacy", for RAB-style approach "Newly-built", for tilted annuity approach *(vs categorisation based on "non-replicable" and "replicable" assets).*[88]	Rationale for choice of annualisation approach for each asset was not clearly set out in Frontier report accompanying the JCRA's Consultation.
Application of "tilted annuity" annualisation approach	Removal of demand "tilt" from tilted annuity formula (formula now based on asset price tilt only).	Previous approach resulted in a profile of annualised costs that would result in JT under-recovering costs. Formula based on asset price tilt only still results in efficient profile of cost recovery.
Allocation of "office building" capital costs	Based on occupancy of floor space in JT building stock. *(vs JT wholesale broadband share of revenues, which was used in the cost model used to inform the JCRA's Draft Decision)*	More accurate approach, made possible by provision of additional data by JT following the JCRA's Consultation.
Operating costs		
Opex categories considered	Revised set of categories. Includes additional cost categories, such as "Common Costs" and "Property Management".	Provision of additional data by JT following the JCRA's Consultation.

[88] We note that this change is just a change in semantics, and therefore does not result in a change in the annualisation approach applied to each asset class.

Model element	Revision to approach in cost model developed for the Consultation	Driver of change
"Base year" for operating cost forecasts	Average over 2017-2020 *(vs 2019 data only)*	Availability of 2020 data in JT financial accounts. Operating costs vary year-on-year, which means the use of an average across multiple years is likely to be as more accurate reflection of a "representative" year over the price control period.
Allocation of operating costs	Revised set of allocation keys to reflect the new set of operating cost categories.	Required to consider the new set of cost categories.
Operating cost efficiency gains	2.5%/yr *(vs 4.5%/yr)*	Consideration of additional data sources provided in responses to the JCRA's Consultation

Source: Frontier

frontier economics

www.frontier-economics.com