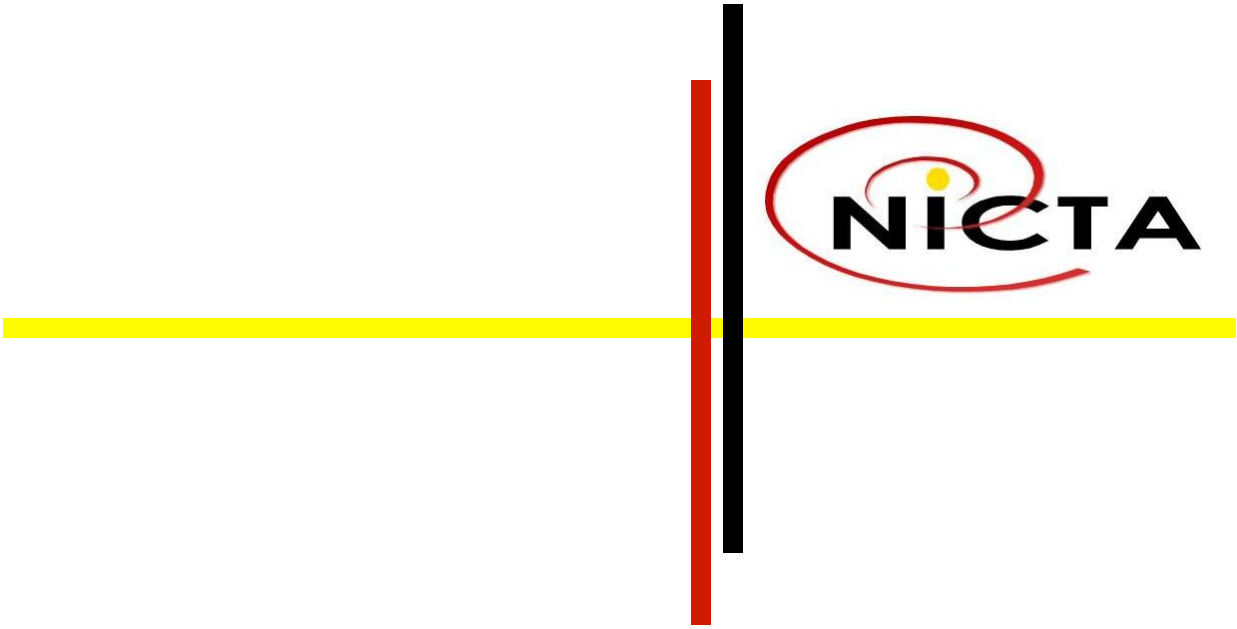

DISCUSSION PAPER

Public inquiry into the potential declaration of certain wholesale telecommunications services

Issued on 28th May 2018

Contents

1 EXECUTIVE SUMMARY

The *National Information and Communications Technology Act 2009* (***the Act***) provides for NICTA to conduct public inquiries into whether or not particular wholesale services should be made 'declared services' by the Minister. An operator licensee that supplies a declared service must comply with particular non-discrimination obligations. The terms and conditions of supply of a declared service must be consistent with the general pricing principles specified in the Act and the service-specific principles that must be specified by NICTA for each declared service. NICTA may also be called upon to arbitrate a dispute between two operator licensees regarding the terms and conditions of supply of a declared service.

NICTA has decided to conduct a public inquiry to consider the potential declaration and renewed declaration of a range of wholesale telecommunications services, in particular:

- wholesale submarine cable capacity and access to related facilities;
- wholesale voice call termination on individual fixed and mobile services;
- wholesale mobile access and call origination services;
- wholesale fixed access and call origination services;
- wholesale broadband capacity services; and
- wholesale leased line services.

The terms of reference for this inquiry are provided at Attachment A.

As set out in this discussion paper, NICTA staff's preliminary view is that the following wholesale services should be recommended to the Minister for declaration:

- international submarine cable transmission capacity service;
- international submarine cable gateway access service;
- mobile terminating access service;
- fixed terminating access service;
- mobile tower sharing service;
- wholesale broadband capacity service.

NICTA invites written comments in response to these preliminary conclusions.

The question that NICTA would encourage submissions to address in the case of each wholesale service is whether there is agreement or disagreement with the assessment that NICTA has made and the reasons for that view. In addition submissions might consider whether there are other wholesale services, or alternative wholesale service definitions, that NICTA should have considered and whether those services should be declared or not.

Submissions should be submitted via email to inquiry.submission@nicta.gov.pg and must be received by **noon Friday 29th June 2017**.

2 BACKGROUND

2.1 The legislative regime

2.1.1 Operator licensees may, at any time, supply wholesale services to other operator licensees under terms and conditions that are commercially agreed. In addition a regulated wholesale access regime is provided for in Part VI of the Act. Under that regime:

(a) NICTA may, following an inquiry, recommend to the Minister that certain wholesale services should be made **declared services**;

(b) The supply of declared services is subject to the **general pricing principles** specified in the Act and also to **service-specific pricing principles** that are determined by NICTA;

(c) Access providers (i.e. operator licensees) that supply declared services are required to comply with certain **non-discrimination obligations** under s.136 of the Act in relation to their supply of declared services (unless exempted). This means that an access provider must:

- supply the declared service to, and interconnect relevant facilities with, any access seeker that requests such;
- supply the declared service and associated interconnection services to access seekers with a technical and operational quality of service equivalent to that which the access provider supplies to itself;
- supply the access seeker with ordering and provisioning and fault handling services that are equivalent to that which the access provider supplies to itself; and
- supply the access seeker, if requested, with billing information necessary to enable the access seeker to supply retail services using the declared service.[1]

(d) The **terms and conditions** on which an access provider fulfils its non-discrimination obligations are to be commercially agreed between the access provider and the access seeker. An access provider may also set out terms and conditions in a **reference interconnection offer** (***RIO***). A RIO must be approved by NICTA;

(e) NICTA may specify **model non-price terms and conditions** relating to the supply of a declared service (s.133);

(f) In the event that an agreement on the terms and conditions relating to an access provider's fulfilment of its non-discrimination obligations cannot be reached, the terms and conditions of access will be as set out in any relevant RIO that the access provider has submitted to NICTA and which NICTA has accepted (s.138). In the absence of both an agreement and a RIO, the terms and conditions of access are those determined by NICTA through **arbitration** (s.138). In making such a determination, NICTA

[1] Section 21 of the *National Information and Communications Technology (Operator Licensing) Regulation, 2010* specifies the required billing information.

must have regard to any relevant model non-price terms and conditions it has previously specified (s.133) among other factors (s.149).

2.2 Current declared services

2.2.1 There are currently three declared services, as follows:

- domestic mobile terminating access service;
- domestic fixed terminating access service; and
- all facilities access services that may be supplied by means of any facility constructed under a universal access Project Agreement for the life of that facility (deemed to be declared under section 131 of the Act).

2.2.2 The following services were until very recently (when the declaration expired) also declared services:

- international submarine cable transmission capacity services; and
- international submarine cable gateway access services.

2.2.3 The present inquiry is reviewing and, if appropriate, renewing the declaration of these five services. The potential declaration of other services is also being examined.

2.3 The inquiry and declaration process

2.3.1 NICTA may only recommend that the Minister declare a particular wholesale service if NICTA is satisfied that such a declaration would satisfy all of the declaration criteria set out in section 128 of the Act as follows:

The "declaration criteria" are as follows –

(*a*) that declaration of the wholesale service will further the achievement of the objective of this Part as set out in Section 124; and

(*b*) specifically, in relation to the competition objective, that –

(i) access or increased access to the wholesale service (as a consequence of declaration) is necessary for the promotion of effective competition in at least one market other than the market for the wholesale service; and

(ii) the wholesale service is supplied in whole or in part via a facility that cannot feasibly be substituted, as a matter of commercial reality, via another facility in order to supply that wholesale service; and

(*c*) specifically, in relation to the efficiency objective, that –

(i) declaration would not materially compromise the incentives for efficient investment in any facility over which the wholesale service may be supplied; and

(ii) access or increased access to the wholesale service (as a consequence of declaration) is technically feasible having regard to the specific factors identified in Section 124(2)(a); and

(iii) in the case of wholesale services that are facilities access services, increased access to the wholesale service would avoid inefficient replication of underlying facilities that may be efficiently shared.

2.3.2 The objective of Part VI of the Act, as set out in section 124, is as follows:

> (1) The objective of this Part and Part VII of this Act is to –
>
> (a) promote effective competition in markets for ICT services in Papua New Guinea, to be known as the "competition objective", subject to –
>
> (b) promoting the economically efficient use of, and the economically efficient investment in, the facilities by which ICT services may be supplied, to be known as the "efficiency objective".
>
> (2) In determining the extent to which a particular thing is likely to further the achievement of the efficiency objective, regard shall be had (without limitation) to all of the following matters –
>
> (a) whether it is technically feasible for the relevant ICT services to be supplied, having regard to –
>
> (i) the technology available or likely to become available; and
>
> (ii) the reasonableness of the costs involved; and
>
> (iii) the effect of supplying the ICT services on the integrity, operation or performance of other ICT services or facilities; and
>
> (b) the legitimate commercial interests of the access provider in supplying the ICT services, including the ability of the access provider to exploit economies of scale and scope; and
>
> (c) the incentives for investment in the facilities by which the ICT services may be supplied, including the risks involved in making the investment.

2.3.3 Before NICTA may consider whether or not the declaration of a particular service would satisfy the declaration criteria it must first identify suitable candidate services for consideration. Although some potential wholesale services are envisaged in the Act itself,[2] NICTA staff have used the market analysis process to identify suitable candidate wholesale services. The approach to the definition of ICT service markets and the analysis of competition within those markets is set out in NICTA's *Market Analysis Guidelines*.[3]

2.4 Structure of this discussion paper

2.4.1 The remainder of this discussion paper is organised around the separate telecommunications markets that NICTA staff have defined and analysed. Pursuant to the inquiry terms of reference (at Annex A), where a market is found to not be effectively competitive NICTA staff consider whether the declaration of one or more specific wholesale services in that market would satisfy the statutory declaration criteria.

2.4.2 Chapter 3 looks at the market for wholesale capacity on, and access to, international fibre optic submarine cables and considers the potential declaration of:

- the international submarine cable transmission capacity services;
- the international submarine cable gateway access services; and

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[2] For example, in subsection 131(7) of the Act.

[3] Available at http://nicta.gov.pg/images/consultative_papers/2016/market_analysis/Market-Analysis-Guidelines---FINAL.pdf

- the international submarine cable duct access service.

2.4.3 Chapter 4 looks at the market for wholesale voice call termination on individual fixed and mobile networks and considers the potential declaration of:

- the mobile terminating access service; and
- the fixed terminating access service.

2.4.4 Chapter 5 looks at the market for wholesale mobile access and call origination services and considers the potential declaration of:

- the mobile tower sharing service.

2.4.5 Chapter 6 looks at the market for wholesale fixed access and call origination services, which comprises potential wholesale services such as duct sharing, dark fibre access, unbundled local loop, and wholesale line sharing. However, NICTA considers that the circumstances do not warrant formal consideration being given to the potential declaration of any of these services.

2.4.6 In the context of the market analyses in Chapter 6, NICTA has also given consideration to the costs and benefits of the implementation of pre-selection pursuant to section 188 of the Act. That consideration is summarised in Annex B. Based upon that preliminary analysis NICTA considers that the implementation costs would likely outweigh the potential benefits and that further and more detailed consideration of the potential implementation of any form of pre-selection is not warranted at this time.

2.4.7 Chapter 7 looks at the market for wholesale broadband capacity and considers the potential declaration of:

- wholesale broadband capacity services.

2.4.8 Chapter 8 discuss whether a market for wholesale leased lines exists. NICTA considers that the circumstances do no warrant formal consideration being given to the potential declaration of a wholesale leased lines service.

2.4.9 Where relevant, the draft declaration instruments considered in Chapters 3–8 are provided at Annexes C–F, inclusive.

2.5 Submissions in response to this discussion paper

2.5.1 NICTA invites written submissions in response to the issues raised in this discussion paper from any interested parties. Arguments and assertions (as distinct from statements of opinion) should be supported with evidence and data, particularly if they are contrary to the current understanding or tentative conclusions set out in this discussion paper.

2.5.2 Submissions should be submitted via email to **inquiry.submission@nicta.gov.pg** and must be received by **noon Friday 29th June 2018**.

2.5.3 Copies of all submissions received will be published on NICTA's Public Register consistent with the requirements on NICTA under subsection 229(3) of the Act. Claims for confidentiality over any written information submitted to NICTA in response to this public

consultation process are governed by section 44 of the Act. Under section 44 of the Act, NICTA ultimately determines whether or not it will accept a claim for confidentiality and exclude from publication the information that is subject to that claim. The process for claiming confidentiality is set out in the *Guidelines on the submission of written comments to public consultations and public inquiries*. Any respondent that wishes to claim confidentiality over information that it submits in response to this discussion paper should follow the procedures described therein.

3 THE MARKET FOR WHOLESALE CAPACITY ON, AND ACCESS TO, INTERNATIONAL FIBRE OPTIC SUBMARINE CABLES

3.1 Background

3.1.1 In 2012–13, NICTA identified a national market for wholesale capacity on, and access to, international fibre optic submarine cables and recommended that the Minister declare:

- the international submarine cable transmission capacity service; and
- the international submarine cable gateway access service.

(collectively, ***the submarine cable services***).

3.1.2 Those services were declared on 22nd March 2013. That declaration expires on 22nd March 2018.

3.2 Relevant Market

3.2.1 The international submarine cable transmission capacity service and the international submarine cable gateway access service are supplied within a national market for wholesale capacity on, and access to, international fibre optic submarine cables. NICTA remains of the view that these services are effective substitutes for one another: that is, gateway access (coupled with the purchase of an Indefeasible Right of Use (***IRU***) on a relevant cable) is an alternative means of accessing international connectivity to the lease of capacity from Telikom.

3.2.2 Previously this market was found to comprise only the submarine cable services supplied by Kumul Telikom Holdings[4] (***Kumul***) with respect to the APNG2 submarine cable landed at Ela Beach and the branch of the Pipe Pacific Cable 1 (***PPC-1***) submarine cable landed at Madang. However, in light of the various plans that have been floated publicly with respect to establishment of additional (and/or replacement) international submarine cable links,[5]

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[4] Or rather, Telikom PNG as it was called at the time.

[5] For example:

(1) the so called Coral Sea Cable connecting PNG and Solomon Islands to Australia ('New Undersea Cable Initiative to improve internet speed and cost in PNG', *PNG Today*, 19th April 2018, available at http://news.pngfacts.com/2018/04/new-undersea-cable-initiative-to.html;

(2) a new cable between Port Moresby and Sydney, Australia (James, D. 'Kumul Telikom urgently looking to build undersea cable to Sydney, says Chairman', *Business Advantage PNG*, 20th September 2017, available at www.businessadvantagepng.com/kumul-telikom-looking-to-transform-papua-new-guinea-internet-by-building-undersea-cable-to-sydney-says-chairman/;

(3) a new cable between Vanimo and Jayapura, Indonesia (DataCo, *Telin Agrees to provide cable landing facility and IRU capacity for PNG DataCo* (media release), 22nd December 2016, available at www.pngdataco.com/index.php/component/content/article/90-ntn/109-dataco-signs-land-cable-deal?Itemid=490;

(4) a new cable (i.e. ICN2) between Port Moresby and Port Villa, Vanuatu (DataCo, 'NTN New Projects', at www.pngdataco.com/index.php/ntn/ntn-new-projects

NICTA now considers that there is potential for wholesale supply-side substitution which broadens the boundaries of the market to include any alternative supplier(s) of submarine cable services (on other, as yet unconstructed, cables) that may enter the market within the next 2–3 years.

3.2.3 However, based on public statements made to date, it seems likely that any such new submarine cables would be controlled by either Kumul or some new entity in which Kumul is involved (e.g. with other licensees or investors). Consequentially, although a degree of wholesale supply-side substitution now seems likely, it seems unlikely to constitute an alternative source of supply that would have the potential to constrain Kumul's market power.

3.2.4 NICTA has considered the potential for wholesale demand-side substitution in favour of satellite-based services. Although some degree of such substitution is probable, NICTA considers it is practicable only for applications and products that have relatively low international capacity requirements. International experience, including in other Pacific nations, shows that such substitutability is limited and that high speed and high capacity applications and products require services based on fibre-optic cable technologies.[6] Satellite-based services are thus unlikely to provide a material constraint on a hypothetical monopolist supplier of the submarine cable services.

3.2.5 The possibility of wholesale demand-side substitution in favour of terrestrial links was also considered, such as a fibre-optic cable or microwave link to Jayapura, Indonesia. However, there are currently no such options available in PNG. Although there are occasional trials or proposals put forward for the establishment of such links, the lead time for such an endeavour would be likely to be well over a year, making such systems an unrealistic substitute in the event of a SSNIP.[7] Further, in the case of microwave, the overall limitations of the capacity of such systems compared to the capacity of fibre cables make them inferior and not fit for most of the purposes commonly associated with submarine cable usage.

3.2.6 NICTA staff considered the potential for retail demand-side substitution—that is, where the retail purchaser of international capacity is persuaded to use an alternative product in response to the SSNIP. However, the retail customers' options would be limited to either switching to another service provider that was dependent on the same hypothetical monopolist for its international connectivity, or switching to a service provider that sourced its international connectivity via satellite-based services. In order for retail customers to switch to an alternative service provider they would have to be willing to accept the consequential potential service degradation (e.g. in terms of latency) that would be

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[6] For example, see *Explanatory Memorandum to the Decision of the Info-communications Development Authority of Singapore on the Request by Singapore Telecommunications Limited for Exemption from Dominant Licence Obligations with respect to the 'International Capacity Services' Market*, (2005) paragraph 46, available at https://www.imda.gov.sg/regulations-licensing-and-consultations/consultations/consultation-papers/2004/singtels-request-for-exemption-from-dominant-licensee-obligations-with-respect-to-the-provision-of-international-capacity-services

[7] Small but Significant Non-transient Increase in Price

associated with satellite-based communications. It seems unlikely that retail customers (to the extent they are or could become aware of such matters) would prefer such a consequence to the acceptance of the SSNIP.

3.2.7 NICTA remains of the view that the market is national in its scope. Although physical access to the PPC-1 cable has to occur at the cable landing station in Madang, and physical access to the APNG-2 cable has to occur at the landing station at Ela Beach, the factors of competition governing the supply of the submarine cable services via those particular cables are nationally consistent and apply regardless where the wholesale customer is located in PNG (notwithstanding the differences in the pricing of cable transmission capacity service on the two cables, noted below).

3.3 Competitive assessment

3.3.1 Kumul is the only supplier in this market for wholesale capacity on, and access to, international fibre optic submarine cables. It controls the only two cable landing stations in PNG and, through those facilities, controls access to the two international submarine cable systems to which PNG is presently connected. Kumul thus has a market share of 100%. These conditions are likely to persist for the immediate future.

3.3.2 The cable landing stations and related facilities that Kumul controls are essential to the supply of services in this market, which in turn are essential inputs in numerous downstream retail markets that require international connectivity. It would be impracticable for another licensee to duplicate that infrastructure in relation to either of the submarine cable systems that are currently landed in PNG. Potential new entry would also be deterred by Kumul's relative cost advantage as its investment costs are sunk and it enjoys substantial economies of scale relative to any new entrant. (In any case, as noted is paragraph 3.2.3, the various new cables that have been proposed tend to assume the involvement of Kumul in some capacity.)

3.3.3 Given the absence of suitable alternatives to the submarine cable access services, wholesale customers of Kumul have little leverage with which to establish effective countervailing power. Some of the demand of those wholesale customers could be (and has been) transferred to satellite on a self-supply basis. However, satellite capacity is an inferior and therefore inadequate substitute for submarine cable capacity for many retail service purposes.

3.3.4 The absence of any potential competition or significant countervailing buying power means Kumul has an incentive and the ability to set its prices for the submarine cable services at levels that maximise Kumul's profits at a given level of demand. A consequence of such pricing behaviour would be that the quantity of capacity/access demanded, consumer surplus, and total welfare would all be less than their potential values under competitive conditions.

3.3.5 As Kumul is vertically integrated, with a presence in both the wholesale and downstream retail markets, it also has an incentive and the ability to discriminate in its supply of the submarine cable services in ways that unfairly advantage its own retail operations relative to

competing retail services providers such as Digicel. For example, Kumul could (in the absence of a declaration under Part VI of the Act) charge a higher price to downstream competitors than the price that Kumul implicitly charges to its own retail arm (i.e. price discrimination between external and internal supply) or supply its downstream competitors with services of a lesser quality than those Kumul supplies to its own retail arm. Such behaviour would unfairly raise its rivals' costs relative to Kumul's own retail operations.[8]

3.3.6 Given these circumstances NICTA has concluded that it is appropriate to consider the potential (re)declaration of the submarine cable services. NICTA does not believe that it would be appropriate to leave such issues to be addressed solely through ex post regulation. This is because the potential harm to competition in the downstream retail markets would be difficult to reverse if it was permitted to occur. Further, that potential harm largely can be prevented (or at least substantially mitigated) through ex ante intervention under Part VI of the Act.

3.4 Identification of wholesale services for potential declaration

3.4.1 NICTA proposes that consideration be given to the renewal of the declaration of the two submarine cable services that were declared in March 2013, namely:

- the international submarine cable transmission capacity service; and
- the international submarine cable gateway access service.

3.4.2 The proposed definition of those particular services remains unchanged from March 2013 and is set out in the draft declaration instrument at Annex C.

3.4.3 In addition, in anticipation of the construction of any new or replacement cable, NICTA proposes that consideration also be given to the declaration of a third service in this market, namely a beach manhole and associated duct access service. The proposed definition of this service is also set out in the draft declaration instrument at Annex C.

3.5 Consideration of the proposed wholesale service declaration

3.5.1 The proposed terms of the declaration of the three identified submarine cable services are set out in the draft declaration at Annex C. The proposed terms are substantially the same as the existing declaration (with the exception of the additional service). In short:

(a) the transmission capacity service and the gateway access service are separate wholesale services, meaning that although that may be offered as a bundle they must also be offered and made available separately (i.e. unbundled);

[8] The costs of Kumul's downstream competitors would be raised by quality discrimination, for example, if additional efforts or investments were necessary to offset the quality disadvantage. The sales of Kumul's downstream competitors could be restricted if the differences in quality cannot be offset and are perceived by retail customers.

(b) the transmission capacity service includes the supply of backhaul transmission capacity to the extent that such is necessary to connect an Access Seeker's facilities at a virtual colocation site to the Access Provider's facilities in a cable landing station;[9]

(c) the gateway access service enables an Access Seeker, among other things, to do any or all of the following:

- access the international gateway facilities of an Access Provider including, but not limited to, physical network infrastructure and ancillary services such as power supplies and air-conditioning;
- physically collocate its facilities in any available space within the Access Provider's cable landing station; and
- physically or virtually collocate its facilities in any available space within a relevant switching centre controlled by the Access Provider; and

(d) the cable duct access service enables an Access Seeker to provide its own network transmission capability to interconnect directly with the submarine cable system facilities and not be reliant at all on transmission services from the cable landing point or the cable landing station provided by Access Provider if the Access Seeker chooses not to be so reliant.

Competition objective

3.5.2 NICTA is of the preliminary view that the draft declaration would promote the competition objective.

3.5.3 International connectivity, particularly via fibre-optic submarine cables, sits at the very top of the supply chain of many ICT services and is particularly important for those ICT services that involve high speed access to and use of the internet. International connectivity is of course possible via satellite-based services in addition to fibre-optic submarine cables; however, due to quality differences and capacity constraints, satellite-based connectivity is considered to be an inferior substitute for international connectivity via fibre-optic cables for many types of communications services. For example, the high latency of satellite transmissions can affect the quality of voice and data transmissions and the transmission speeds of fibre-optic cables are considerably greater than those possible with the latest satellites.

3.5.4 The proposed declaration will ensure that the access terms will be non-discriminatory and the access prices will be cost-based. This in turn should increase access to and utilisation of the submarine cable services in question. Increased and improved access to international connectivity via these services is necessary to promote competition in many downstream retail markets, in particular the national retail markets for mobile telecommunications

[9] This means that any such supply of backhaul transmission capacity by the Access Provider is subject to the non-discrimination obligations and must be consistent with the General Pricing Principles and any relevant Service Specific Pricing Principles. Any other supply of backhaul transmission capacity (including any supplied by the Access Seeker) is not a declared service.

services and broadband internet access. This is because international connectivity is a key input in the supply of internet access and international telecommunications services.

3.5.5 The importance of access to submarine cable facilities for the development of competition in broadband markets is widely recognised. For example, World Bank's *Broadband Strategies Handbook* notes:

> 'The potential for international connectivity to be a bottleneck in the development of broadband connectivity cannot be overstated...Because all operators in a market, particularly new entrants, may not have the resources to own and operate a cable landing station, the owners of such stations—generally the incumbent operators in newly liberalized markets—may be required to provide access to the station, and therefore to the cable, on reasonable terms to competing service providers. Limited access to landing stations can have a chilling effect on the diffusion and take-up of broadband services.'[10]

3.5.6 Another World Bank report, focused on the advancement of broadband in the developing economies of Africa, states:

> 'High-speed international connectivity is currently a major constraint on the delivery of broadband services in Sub-Saharan Africa. Most of the region is dependent on satellites for international connectivity. Even where countries are connected to international submarine cables…,the impact has been very limited because access to these cables is controlled by individual operators that have been able to set high prices. Access to high-bandwidth international capacity at low prices is a necessary (but not sufficient) condition for the development of mass-market broadband. The global experience of international connectivity shows clearly that international infrastructure competition results in lower prices and higher bandwidth. In order to support the development of such competition in Sub-Saharan Africa, licensing and regulatory frameworks, including rights to land submarine cables, may need to be reformed to ensure that monopoly control over bottleneck facilities does not emerge. However, this facilities competition may take some time to develop. In the short run, regulators will have a key role to play in guaranteeing access to bottleneck facilities such as landing stations.'[11]

3.5.7 Increased access would foster competition in the downstream markets in a number of important ways. Most significantly, it would remove the potential for Kumul to:

(a) deny its competitors in the downstream markets access to or capacity on international submarine cables (including denials of reasonable terms);

(b) set excessively high prices for access to, or capacity on, international submarine cables;

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[10] Kelly, T. and Rossotto, C. (2012) *op.cit.*

[11] Williams, M.D. (2009), *Broadband for Africa: Developing backbone communications networks*, Washington, DC, World Bank January.

(c) discriminate in terms of price or quality between its internal and external supply of access to, and capacity on, international submarine cables (i.e. to the advantage of its own downstream business operations and to the disadvantage of its competitors in those same downstream markets).

3.5.8 Further, declaration of the three submarine cable wholesale services described above will provide access seekers with greater flexibility and choice to determine how they might develop their businesses and adjust their business models. This in turn will leave open for commercial consideration how best to compete in the relevant downstream markets.

3.5.9 By the same token, *not* declaring the service will have a negative effect on the pricing, quality and choice of ICT services in those downstream markets.

3.5.10 The services in question are supplied principally over facilities that constitute a cable landing station and enable access to, and use of, an international submarine cable system. It is not possible to supply the services without access to the facilities that constitute a landing station and it is not considered economically feasible to replicate such facilities for the purpose of accessing either of the existing submarine cable systems.

Efficiency objective

3.5.11 NICTA is of the preliminary view that the draft declaration would also promote the efficiency objective.

3.5.12 The declaration of the international submarine cable transmission capacity service and the international submarine cable gateway access service would promote the efficiency objective by encouraging greater utilisation of the existing capacity in the submarine cables market.[12] The declaration of the cable duct service is designed to prevent practices that would undermine or negate the declaration of the first two services. Among other things, the greater utilisation of existing capacity that would be encouraged by these declarations would also help to improve the investment incentives in the medium to longer term.

3.5.13 The services in question are supplied principally over facilities that constitute a cable landing station and enable access to, and use of, an international submarine cable system. Following declaration, the pricing of access to and use of these services would be in accordance with the General Pricing Principles and thus set so as to generate expected revenue that is sufficient to meet the efficient costs of providing access to the services. That includes a reasonable return on investment over the economic life of the assets employed that is commensurate with the regulatory and commercial risks involved. Although that return on investment might be different from the ideal return desired by a particular facility owner or investor, it is nonetheless sufficient to encourage continued investment in the relevant facilities, particularly given the availability of subsidised funding from international development banks for investments in improved international connectivity.[13]

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[12] ITU (2008), *Trends in Telecommunications Reform 2008: Six Degrees of Sharing*.

[13] Indeed, it is typically a condition of such financing that the resultant additional international capacity is made available on an open access basis and at pricing that is cost-based.

3.5.14 The experiences of other countries that have taken similar regulatory actions in relation to access to submarine cable transmission capacities and facilities in landing stations shows that such regulation actually encourages increased investment by the landing station operators as a result of increased demand and regulatory and pricing certainty.[14] For example, the InfoComm Development Authority in Singapore (now the Info-Communications Media Development Authority) found that as a consequence of its imposition of access and non-discrimination obligations, the revenues of the submarine cable landing station operators in Singapore increased significantly—despite that regulation forcing a decrease in wholesale prices—as retail usage and hence demand increased exponentially.[15]

3.5.15 Access to the services in question has been demonstrated to be technically feasible in PNG as a consequence of the March 2013 declaration and also in many other countries.[16] If insufficient space should exist to enable colocation to be provided at a landing station as part of the supply of the cable gateway access service, the proposed terms of the declaration allow for access to be provided by way of virtual colocation at a gateway exchange, if necessary in conjunction with backhaul transmission capacity between the two sites. This has also been shown to be technically feasible under the term of the March 2013 declaration and also in many other countries.

3.5.16 Paragraph 128(c)(iii) of the Act requires that, with respect to the efficiency objective, in the case of a wholesale service that is a facilities access service, increased access to the wholesale service would avoid inefficient replication of underlying facilities that may be efficiently shared. Both the gateway access service and the duct access service are facilities access services. (The transmission capacity service is a network service, not a facilities access service.) In both cases, NICTA considers that increased access would avoid inefficient replication of submarine cable landing station facilities (to the extent that replication of such is practicable).

3.6 Preliminary conclusions

3.6.1 NICTA proposes to conclude that:

(a) there is a national market for wholesale capacity on, and access to, international fibre-optic submarine cables and that Kumul has a position of substantial market power in that market; and

(b) the declaration of three services within that market, namely:

- the international submarine cable transmission capacity service;
- the international submarine cable gateway access service; and
- the international submarine cable duct access service;

on the proposed terms set out in Annex C would satisfy the declaration criteria.

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[14] ITU, *op.cit.*.

[15] IDA (2008) *International gateway liberalization: Singapore's experiences*; presentation to the ITU GSR.

[16] Including Bahrain, Hong Kong, India, Jordan, Mauritius and Singapore

4 The markets for wholesale voice call termination on individual fixed and mobile networks

4.1 Background

4.1.1 The domestic mobile terminating access service (***DMTAS***) and the domestic fixed terminating access service (***DFTAS***) were deemed to be declared services upon the commencement of the Act in accordance with section 131. As per the terms of those deemed declarations, which are set out in Schedule 1 to the Act, the deemed declarations expired on 31st December 2014.

4.1.2 NICTA reviewed the markets for DMTAS and DFTAS in 2014, concluding that the requirements for declaration continued to apply in these services. Hence the deemed declarations were extended until 31st December 2019.[17]

4.1.3 Even though that Declaration still has almost two years before expiration, it is now time for a further review to confirm the ongoing requirement for declaration of these services. It is convenient to review that Declaration as part of this more general review of wholesale services.

4.1.4 In 2012, NICTA conducted a public inquiry into the need for declaration of certain wholesale services in international connectivity markets. In that inquiry NICTA expressed its concern 'about the relatively high costs of calling into PNG compared to other countries in the region and the potential that such costs have to suppress the volume of international call traffic into PNG and consequently the associated welfare benefits of high service level adoption.'

4.1.5 As a remedy to this situation NICTA's 2014 recommendation to the Minister sought to clarify that the definition of previously declared DMTAS and DFTAS included the terminating segments of inbound international calls. The practical effect of that decision would have been to reduce call termination rates for inbound international calls, with the probable impact of reducing the retail prices for those calls in correspondent countries, and hence boosting call volumes, trade and, ultimately, welfare.

4.1.6 However, NICTA's recommendation to the Minister was disputed by Digicel and referred to the ICT Appeals Panel, which upheld NICTA's authority to include international services within the definition of the declared services, but ruled *inter alia* that:

> *… rather than describing the terms of the new recommended Declaration as one which "clarifies" that communications originating outside Papua New Guinea were part of the prior Declaration, NICTA should have proposed a variation to the particular terms of the existing declaration and provided in its report reasons and conclusions as to why that variation was desirable.*

[17] Section 2(2) of Wholesale Service Declaration No 1 of 2015, published in National Gazette of 27 March 2015.

4.1.7 In the current review of wholesale services for possible declaration NICTA therefore examines the justification for such a variation in the existing Declaration as directed by the ICT Appeals Panel.

4.2 Relevant Market

4.2.1 In the 2014 declaration the service definitions were focused—although not exclusively—on calls originating within PNG – hence the declarations of *Domestic* Mobile Terminating Access Service and *Domestic* Mobile Terminating Access Service. As explained above, NICTA now wishes to examine the case for the inclusion of *International* Mobile Terminating Access Service and *International* Fixed Terminating Access Service within the same declarations. In effect this would mean defining the relevant markets more generically, namely Mobile Terminating Access Service (***MTAS***) and Fixed Terminating Access Service (***FTAS***), with each market being defined to include the termination of both domestic and international calls. This is a different approach to that adopted in 2014. In 2014 there was a preference for retaining the description of the service that was originally deemed to have been declared on commencement of the Act. On reconsideration there is no strong reason for such a preference and no reason to preserve the definition of a wholesale service simply because it was deemed to have been declared in 2009.

4.2.2 A key justification for the wider definition of the relevant market and service now in contemplation is that the service being supplied by the operator in PNG is essentially the same for both domestic and international calls:

(a) voice call and SMS/MMS termination on individual mobile networks in PNG; and

(b) voice call termination on individual fixed networks in PNG.

4.2.3 The wholesale services provided for the termination of international inbound calls differ from the equivalent domestic services only in that:

(a) the service includes routing through an international gateway as well as domestic switches and transmission facilities; and

(b) the service is provided to another telecommunications service provider that is outside of PNG rather than a domestic service provider.

4.2.4 It may also be noted that domestic and international termination services are sometimes direct substitutes for one another. Thus a caller from outside PNG may make a standard PSTN call to PNG that uses the wholesale international terminating access service, or the caller may use an "over the top" (***OTT***) service that brings the call into the country over the Internet and then uses a wholesale domestic terminating access service.

4.2.5 Other forms of substitution are possible, and recent technology developments and changes in the patterns of telecommunications usage have increased the scope of substitute services. This substitution takes two main forms:

(a) Substitution between FTAS and MTAS. Most users of fixed telephone services also have access to a mobile telephone, thus giving callers the opportunity to substitute a call to a fixed line with a call to a mobile. Potentially, therefore, FTAS and MTAS could be

considered as services within the same market. However, this substitution works only one way since most calls to mobiles are not substitutable by calls to fixed lines, and, given the substantial reliance in PNG on mobile services for voice calling, substitution in this sense is not possible most of the time.[18]

(b) Substitution of both FTAS and MTAS by OTT services such as Skype, Viber, Facetime and WhatsApp. Increasingly these apps are installed on computers and mobile devices and offer users the chance of end-to-end OTT services, thus bypassing the need for FTAS or MTAS. These services undoubtedly provide an alternative means for making *some* calls, but the scale of the substitution effect is limited because both parties have to have access to the OTT service and, in some cases, the caller has to know the called party's user name. This tends to limit OTT services to closed user groups such as families, friends or business acquaintances. However, it should be noted that there are significant incentives for using these alternative approaches for international calls in particular given the high-price of inbound international PSTN calls.

4.2.6 While substitution by alternative services is undoubtedly increasing, and will do so further as the use of 3G and 4G services proliferates, NICTA notes that the phenomenon is less developed in PNG than in many other countries. Even in countries where it is more developed, it has not stopped regulators continuing with regulation of FTAS and MTAS (or equivalent) services. The reason is simple: should a calling party wish to contact a particular user on a particular fixed or mobile number, then the originating network operator still has no choice but to use the wholesale FTAS or MTAS service. And this applies whether the call originates in PNG or overseas.

4.3 Competitive assessment

4.3.1 Call termination markets are susceptible to ex ante regulation because they have high non-transitory barriers to entry and they are not trending towards being effectively competitive. Further, ex post control by the *Independent Consumer and Competition Act 2002* would of itself be insufficient to address the market failures concerned.

4.3.2 Each network operator has a substantial degree of market power (***SMP***) in the market for termination of calls/messages on its own network. SMP is problematic as it poses a material risk of harm to the development of effective competition in the downstream retail services markets and to consumer's long-term interests.

4.3.3 A prime example of the risks of competitive harm (absent regulation) may be found in the pricing of inbound international calls following the exclusion (in practice) of the wholesale international terminating access service from the DMTAS and DFTAS Declarations of 2014. Analysis conducted by NICTA in December 2016 found that inbound international calls to Australia, Singapore, New Zealand and USA were around 40% more expensive than the equivalent outbound international calls from PNG. Whereas the domestic termination

[18] Data maintained by NICTA from operator sources suggests that of the approximately 1.68 billion mobile call minutes originated on mobile services for termination within PNG in 2016, only 3.8% were directed to fixed services.

rates for inbound international calls to Australia, Singapore, New Zealand and USA use the same cost-based approach as termination of domestic calls, this does not happen in PNG. The result is that prices for inbound international calls to PNG are set well above cost levels.

4.3.4 The simplest and most direct way to address the problem of high prices for inbound international calls is for NICTA to include both domestic and international calls in the declaration of FTAS and MTAS, and then to require all termination rates, both national and international, to be cost-based. Such an approach is widely adopted internationally and in many countries this effectively means the same termination rates apply for national and for inbound international calls.

4.3.5 The ICT Appeals Panel did not rule out such an approach, but it ruled that NICTA could not include such an approach as a variation to the terms of the existing declarations of DMTAS and DFTAS without explicit justification. Furthermore, the ICT Appeals Panel was discussing the approach adopted by NICTA in 2014 and not considering the redefinition of termination services altogether as is now proposed.

4.4 Identification of wholesale services for potential declaration

4.4.1 All of the circumstances described above warrant NICTA's consideration of the potential declaration of two relevant wholesale services, namely:

(a) the mobile terminating access service (MTAS); and

(b) the fixed terminating access service (FTAS).

4.4.2 The proposed definition of those particular services remains unchanged from *Wholesale Service Declaration No.1 of 2014* (***the 2014 Declaration***) and is set out in the draft declaration instrument at Annex D. Each service is defined so as to include, without exception or differentiation, the termination both of calls that originate in PNG and of calls that originate internationally.

4.5 Consideration of the proposed wholesale service declaration

4.5.1 The proposed terms of the declaration of the FTAS and the MTAS (for both domestic and international calls) are set out in the draft declaration at Annex D, which is substantially the same as the 2014 Declaration. NICTA considers that the proposed declaration will further the achievement of the objective of Part VI of the Act, relating to the promotion of effective competition (***the competition objective***), the promotion of economically efficient use of, and the economically efficient investment in, facilities by which ICT services may be supplied (***the efficiency objective***).

4.5.2 The declaration of FTAS and MTAS is necessary to achieve the competition objective because:

(a) being monopoly services there is no adequate restraint imposed on service providers not to set terminating access rates and establish other terminating access terms that might distort or seriously damage competition in the relevant downstream retail markets; and

(b) inappropriate terms set under effective monopoly conditions for terminating access will distort competition and related investment. If the terms inordinately favour the access provider, uneconomic investment in access seeker facilities may well result.

4.5.3 Declaration of these services would also help to promote competition in the retail services market by:

(a) ensuring that the supply of a terminating access services cannot be denied to another network operator or downstream competitor;

(b) requiring prices for the supply of terminating access services to be cost-based, thereby minimising the potential for excessive pricing that leads to allocative inefficiencies; and

(c) minimising the potential and incentive for above-cost termination charges to be combined with price discrimination in the application of the wholesale charges between on-net and off-net calls to foreclose competition through tariff-mediated network effects.

4.5.4 The declaration of FTAS and MTAS will achieve the efficiency objective because declaration will better enable access seekers and, if necessary, NICTA to address circumstances in which an access provider seeks to impose excessive prices or other terms which reflect its market power. For example, if the terms for terminating access seek to require the access seeker to take more services or a greater service than it requires, that would result in inefficient investment. This would not compromise incentives for efficient investment and would actually enable inefficient investment outcomes that might otherwise arise to be negated through regulatory intervention.

4.5.5 Whereas the arguments in the preceding paragraphs generally apply to both domestic and international terminating access services, the case for declaration is not as obvious with international services as it is for domestic services. The direct competition and efficiency benefits of service declaration still exist, but with international services the most obvious benefits are realised by operators outside of PNG (who will pay less for terminating calls into PNG). Nevertheless, NICTA believes that the declaration of international terminating access services will also create competition and efficiency benefits within PNG. The fact that some benefits accrue to parties outside PNG does not preclude benefits from accruing within PNG.

Efficiency objective

4.5.6 Simplistically, the high price of inbound international calls may appear to be efficient in that the operators could use the additional revenues (paid by subscribers outside of PNG) to subsidise domestic services. It is certainly true that high charges for terminating international calls have historically been used as a means of welfare transfer from rich countries to poor ones. This approach was endorsed by the International Telecommunication Union (***ITU***) through the system of international accounting rates that until the 1990s was the sole means of handling international traffic. However, this system broke down as competitive forces drove prices more closely in line with costs, and was more or less killed off by the United States' Federal Communications Commission (***FCC***) in 1998 when it set benchmarks for what were considered reasonable costs for terminating

international calls, and refused to allow US carriers to exchange international traffic with countries that did not stick within these benchmarks[19].

4.5.7 Today, in the context of the trade agreements and globalisation, international calls should be seen not so much for the money they directly generate, but for the opportunities for commerce and social welfare that they create. Put simply, if call prices are high then fewer calls will be made and less of the spin-off economic benefit will be generated. High prices for inbound international calls therefore raise the overall costs for residents and businesses in PNG, reduce overall economic activity and reduce overall national economic efficiency.

4.5.8 It may even be the case that high prices for inbound international calls bring less revenue into the country, thus reducing the efficiency of the operators themselves. Studies have shown that international calls are highly price elastic – people simply refuse to make calls if they perceive the price as being too high, with the result that revenues can actually fall when prices are increased. This is especially so in the Internet age where alternative, cheaper means of communication abound (e.g. Skype and WhatsApp).

4.5.9 The high price of inbound international calls may not be disadvantaging PNG compared with its neighbours (which have similarly high prices) but it is clearly restraining potential economic and social development. Fuller participation in the regional and global economy would result from reducing these particular charges. Even if they don't really represent a major barrier to doing business in PNG, they do send a contrary signal to would-be investors, visitors and immigrants.

Competition objective

4.5.10 One reason for persistent high prices for inbound international calls is the lack of competition in this market. Should a calling party in another country wish to contact a particular user on a particular fixed or mobile number in PNG, then the originating network operator currently has no choice but to use the wholesale international terminating access service provided by that operator in PNG.

4.5.11 Creating more competition in international operations, so as to lower prices for inbound calls requires two things:

(a) licensing of multiple international gateway providers so that telcos in other countries have a choice of potential interconnection partners in PNG with whom to negotiate; and

(b) ensuring that cost-based transit between network operators in PNG, so that any international gateway operator is able to terminate any inbound international call on all networks and not just its own.

4.5.12 Explicitly including international calls in the declaration of MTAS and FTAS will help address both of these requirements by removing the artificial constraint that only domestically-originated calls may be terminated at regulated cost-based rates. This will have two effects:

[19] For example, in November 2009 the FCC adopted an Order to suspend US carrier payments to Tonga and proposed use of a benchmark rate of US$ 0.19 for termination of all calls (including refile) to all carriers in Tonga.

(a) it will allow the existing international gateway providers (and any others that may be licensed in the future) to offer inbound international call termination services to all customers in PNG (not just those on its own network). This will create a market within PNG for international MTAS and FTAS: if the operator of the called party attempts to set excessive inbound international termination rates, the international correspondent may instead choose the international call termination service of another licensee which will in turn purchase (domestic) MTAS or FTAS from the operator of the called party.

(b) It will encourage more OTT providers to provide services within PNG. One of the main sources of competition and constraints on inbound international call prices is usually provided by OTT players such as Skype. Typically Skype carries traffic into the destination country on the Internet and then presents it for local call termination at local rates. This has not happened to date in PNG because cost-based termination rates have been reserved for domestically generated traffic.

4.6 Preliminary conclusions

4.6.1 NICTA proposes to conclude that:

(a) there are separate national markets for wholesale call termination on each individual fixed and mobile network and that each network operator has a position of substantial market power in respect of the market for call termination on its own network; and

(b) the declaration of the FTAS and MTAS on the proposed terms set out in Annex D would satisfy the declaration criteria.

5 The market for wholesale mobile access and call origination services

The market for wholesale mobile access and call origination services includes all services that allow Mobile Virtual Network Operators (***MVNOs***) to provide retail mobile services over another operator's mobile network, including voice and data services. It includes access to passive infrastructure (e.g. towers), carrier selection and national roaming.

5.1 Background

5.1.1 NICTA last examined this market in 2013[20] when an extensive public consultation exercise was held and a decision was reached in March 2014[21] not to recommend the declaration of any particular services in the mobile access and call origination market.

5.1.2 The 2014 decision rested on the fact that four of the declaration criteria from the Act[22] were not met, namely that:

a) declaration would not necessarily, in and of itself, promote effective competition in markets for ICT services in PNG;

b) access to towers is not a pre-requisite for the promotion of competition in at least one market other than the market for the wholesale service/facility itself;

c) the wholesale service/facility can feasibly be substituted as a matter of commercial reality; and

d) declaration would materially compromise the incentives for efficient investment in competitive mobile network infrastructure.

5.1.3 The question four years on is whether anything has changed in the market, and changed sufficiently to require a change in this regulatory position?

5.2 Relevant Market

5.2.1 The market for wholesale mobile access and call origination (***MACO***) services comprises various services that are typically considered to be components of the market, or separate sub-markets, which enable an access seeker to have access to the subscriber base of a mobile network operator.

5.2.2 MACO services include the sharing of and access to passive network elements in the mobile operator's network. Passive elements in this context are non-electronically active elements such as sites, buildings, towers, masts, poles and ducts. In the case of mobile networks the

[20] *Public inquiry into the potential declaration of certain wholesale mobile telecommunications services* issued by NICTA, on 2 August 2013

[21] *Decision and Inquiry report in relation to NICTA's consideration of the potential declaration of certain wholesale mobile telecommunications services*, issued by NICTA, March 2014

[22] Two additional criteria were met: technically feasibility and avoidance of inefficient replication of facilities.

most commonly accessed passive network elements are towers as these are the supporting structures for radio base stations (in 2G networks, or equivalently NodeB in 3G networks and eNodeB in 4G networks). Furthermore it is often the case that a mobile network operator (***MNO***), having constructed a tower for its own purposes, has spare capacity on that tower that could be leased to another MNO.

5.2.3 The MACO service could also involve the sharing of and access to active network elements in the mobile operator's network. Active elements in this context are network elements other than passive elements and include mobile switching, transmission and access to network systems and services. Access to these elements (as well as passive infrastructure) enables an MVNO to supply retail mobile services without investing in its own active infrastructure. For example:

(a) mobile access bundled with wholesale mobile call origination enables an MVNO to supply retail mobile services; and/or

(b) mobile access bundled with wholesale airtime enables the resale of retail mobile services.

5.2.4 Call origination from mobile networks is generally regarded as an indirect access service because it is conditional on selection or pre-selection by the subscribers in question. The services involved are known generally as call selection and carrier pre-selection. In each case the relevant mobile network subscriber must make a choice before the service can be activated. From the perspective of the access seeker the service is, therefore, an indirect access service.

5.2.5 A direct form of call origination can be made available to MNO through domestic roaming services. This is a network service that enables a retail customer of one MNO to use the retail mobile services of another MNO when within the latter's network coverage area and beyond the network coverage area of the first MNO. The customer will, however, not normally be aware that the retail service is being provided by another MNO, the technical and commercial arrangements being sorted by way of a wholesale service agreement.

5.2.6 NICTA considers that the relevant wholesale market includes all of those alternative means for supplying MACO services (together with any other alternatives not mentioned but which are technically feasible). This is because from a supply-side perspective, a supplier of any one of those services could commence supply of any of the other listed services with relative ease (assuming sufficient capacity). Further, from a demand-side perspective, each of the listed services is a means of supplying retail customers with an equivalent retail service. Indeed from the perspective of a retail customer, mobile telephony is fundamentally the same service whether it is supplied by a vertically integrated MNO or by a service provider that is utilising one of the alternative means of obtaining wholesale MACO services identified.

5.3 Competitive assessment

5.3.1 As far as NICTA is aware, there are currently no MACO services currently offered or supplied in PNG. The MNOs are free to offer MACO services on a commercial basis, but none of them has chosen to do so.

5.3.2 Equally, the Minister could require the provision of one or more MACO services as declared services, but following the 2013 inquiry NICTA declined to recommend such a declaration.

5.3.3 Little has changed in the provision of retail mobile services since the 2013 inquiry. Digicel continues to have by far the largest market share; indeed its market share has increased in terms of subscribers, traffic and revenue. See Figure 5.1 below.

Figure 5.1: Indication of developments in the provision of mobile services in PNG

	2013	Current situation	% change
Market shares (subscribers)			
a) Digicel	74.6%	89.5%	+20%
b) bmobile	12.8%	8%	-38%
c) Kumul (Telikom)	12.6%	2.5%	-80%
Market share (traffic)			
a) Digicel	90.6%	96.7%	+7%
b) bmobile	8.8%	2.9%	-67%
c) Kumul (Telikom)	0.6%	0.4%	-33%
Market share (revenue)			
a) Digicel	87.9%	n/a	
b) bmobile	11.5%	n/a	
c) Kumul (Telikom)	0.6%	n/a	

n/a = not available

5.3.4 However, there are signs that bmobile and Kumul (Telikom) have improved their competitive potential by increasing the coverage of their networks. Figure 5.2 shows the increasing scale and scope of their networks in terms of the number of towers (radio cell sites) deployed, and in terms of the network coverage by population and landmass.

Figure 5.2: Indication of developments in the provision of mobile services in PNG

	2013	Current situation	% change
Number of mobile towers deployed			
a) Digicel	766	825	+8%
b) bmobile	188	619	+229%
c) Kumul (Telikom)	60	117	+95%
Network coverage (by population)			
a) Digicel	74%	n/a	
b) bmobile	36%	n/a	
c) Kumul (Telikom)	22%	n/a	
Network coverage (by total area)			
a) Digicel	24.4%	n/a	
b) Bmobile	5.8%	n/a	
c) Kumul (Telikom)	n/a	n/a	

n/a = not available

5.4 Identification of wholesale services for potential declaration

5.4.1 Whilst it may seem that the lack of change in the market situation since 2014 supports the regulatory status quo, the opposite conclusion may equally be drawn. The fact that not much has changed in the market could conceivably provide some evidence in support of declaration of one or more MACO services as the means to effect changes that have demonstrably not occurred in the absence of declaration.

5.4.2 However, lack of change in market structure and market shares in the absence of declaration does not mean that there will be market development if and when MACO services are declared, nor that such development will be efficient.

5.4.3 On balance, NICTA proposes to consider the potential declaration of facilities access services associated with passive mobile network facilities; i.e. mobile tower sharing services. NICTA is aware of unmet demand for such wholesale services. In contrast, NICTA is not aware of any demand for any of the other MACO services.

5.4.4 The proposed definition of this service is set out in the draft declaration at Annex E.

5.5 Consideration of the proposed wholesale declaration

5.5.1 NICTA recognises that the declaration of mobile tower sharing services will only be justified if all of the statutory declaration criteria are met. Two of the declaration criteria were met in 2014 and NICTA is satisfied that they continue to be met namely that:

- access or increased access to the wholesale service is technically feasible having regard to the technology available, the costs involved, and the effect of supply on the integrity, operation and performance of other ICT services and facilities. Tower sharing is undoubtedly feasible as has been demonstrated in many countries over many years. The technologies for tower construction and mounting of equipment that are employed in PNG are the same as elsewhere in the world.
- increased access to the wholesale service would avoid inefficient replication of underlying facilities that may be efficiently shared. There are many areas of PNG that are sufficiently remote and of low population density so as to make replication of towers inefficient, and where service providers could share tower facilities, as has been practised in many other countries.

However, declaration of mobile tower sharing services also requires re-assessing the four criteria that were not met in 2014.

5.5.2 The first of those criteria is that "declaration would necessarily, in and of itself, promote effective competition in markets for ICT services in PNG". Nothing in the experience of the last four years helps to address this criterion since there has not been a declaration of MACO services. Equally, the doubts that were evident in 2014 remain: retail competition may not be effective if all of the service providers are dependent on infrastructure provided by just one MNO, especially when that MNO has a substantial degree of market power. Some doubt has also been cast on the efficacy of declaration from the experience with towers funded by the Universal Service Fund (***USF***). Open access is a condition of USF funding, and Digicel has constructed a number of towers using the USF, but in none of these cases have the other operators sought access to the towers. It is recognised though that this may be a reflection of the location of the USF funded towers and the availability of wholesale backhaul options to those sites.

5.5.3 The second criterion is that mobile tower sharing services be 'a pre-requisite for the promotion of competition in at least one market other than the market for the wholesale service/facility itself'. Today, with the benefit of hindsight, it may be possible to argue that the lack of increased competition in retail mobile services over the past four years is at least in part a *result* of access to towers not being declared. At very least the argument, as stated in 2014, that competition could be promoted in other ways (e.g. by the other MNOs rolling out more infrastructure or by commercial tower sharing agreements) has been weakened by the fact that the level of retail competition has not increased despite considerable network rollout by bmobile and Kumul (Telikom) during the past four years. However, NICTA notes that the merger and recapitalisation of bmobile and Telikom into a single entity (Kumul), coupled with the continuation of its branding agreement with Vodafone, has the potential to stimulate effective competition without declaration of MACO services.

5.5.4 The third criterion is that the wholesale service/facility cannot feasibly be substituted as a matter of commercial reality. The commercial reality over the past four years is that such substitution has not occurred. The analysis conducted by NICTA in 2013/14 suggested that the other MNOs would increase and broaden their tower roll-out programmes (especially in the absence of declaration). To a significant extent this has happened, but there remain parts

of the country in which only Digicel operates towers, and in many of these locations there is no commercial case for a rival to duplicate this investment.

5.5.5 The fourth and final criterion is that declaration would not materially compromise the incentives for efficient investment in competitive mobile network infrastructure. If duplicate mobile infrastructure is commercially feasible then this will provide the deepest and most sustainable form of competition in the industry. In 2014 NICTA judged that there was a risk that declaration would jeopardise such investment in alternative infrastructure. However, bmobile and (to a lesser extent) Kumul (Telikom), have invested in new towers, so that it can now be said with some confidence that declaration really could not compromise their investment incentives significantly further. Furthermore, NICTA believes that the commercial terms for tower sharing should give the access provider an adequate risk-adjusted return on its investment, so that the possibility of tower sharing could act as an incentive for operators to deploy new towers in previously unserved areas.

5.5.6 NICTA notes both the lack of progress over the past four years in establishing effective competition in retail mobile services markets in PNG and the fact that bmobile and Kumul (Telikom) have invested considerably in new mobile towers. Consequently, the risks of declaring MACO services may be less now than they were perceived to be in 2014. However, NICTA also notes that there remains no empirical evidence that declaration is necessary for the promotion of competition in the retail services market and some evidence (on the basis of USF-funded facilities) that declaration will not in and of itself promote effective competition although it will undoubtedly provide competitive choices not currently available in locations which will not sustain the duplication of towers and related infrastructure.

5.5.7 Overall, evidence from the past four years, absent any declaration of mobile tower sharing or other MACO services, suggests that at least the second, third and fourth of the statutory declaration criteria for the making of the proposed wholesale service determination would now be met in this market. Past experience provides no evidence in relation to the first criterion, namely that 'declaration would necessarily, in and of itself, promote effective competition in markets for ICT services in PNG', but it is evident that in areas where only Digicel operates mobile towers retail competition cannot be harmed and may be enhanced by the proposed declaration of mobile tower sharing services.

5.6 Preliminary conclusions

5.6.1 NICTA proposes to conclude that:

(a) there is a national MACO market and that Digicel has a position of substantial market power in that market; and

(b) on the balance of the available evidence, the declaration of mobile tower sharing services in that MACO market on the proposed terms set out in Annex E would, on balance, satisfy the declaration criteria.

6 The market for wholesale fixed access and call origination services

6.1 Background

6.1.1 The market for wholesale fixed access and call origination services has not been subject to formal consideration within PNG until now. To do so at this stage in the evolution of telecommunications services, with an increased emphasis on mobile services in retail markets may seem odd. However, it is important to recognise that much of the infrastructure and active components that constitute modern telecommunications networks and platforms has become multi-modal, and that they serve equally in the delivery of services that are mobile or provided at a fixed location. To emphasise that point, Digicel and Kumul are providing fixed services (services at a fixed location) using cellular mobile technologies. The categorisation of services is increasingly defined by service characteristics at the network edge or that are associated with the device used by the customer, rather than in the mode of delivery or the intelligence at the core of the network.

6.2 Relevant Market

6.2.1 The market for wholesale fixed access and call origination (***FACO***) services is analogous in its scope to the MACO market (the wholesale mobile access and call origination market considered in Chapter 5). The various services that are typically considered to be components of the market, or separate sub-markets, generally comprise services that enable an access seeker to have access to the subscriber base of a fixed network operator, whether directly or indirectly.

6.2.2 Direct access services include the sharing of and access to ducts and dark fibre in the access provider's network, unbundled local loops (***ULL***), and wholesale line rental (***WLR***). In the case of access to the broadband capacity of fibre systems in the trunk or backbone networks, this is usually regarded as part of the market for wholesale broadband capacity (considered in Chapter 7) and not part of the fixed access and call origination market.

6.2.3 Call origination from fixed networks is generally regarded as an indirect access service because it is conditional on selection or pre-selection by the calling subscribers involved. The services involved are known generally as call selection and carrier pre-selection (***CS/CPS***). In each case the relevant fixed network subscriber must make a choice before the service can be activated. From the perspective of the access seeker the service is, therefore, an indirect access service.

6.2.4 The various services that are typically considered to be part of the FACO market are not substitutes from a demand-side perspective, even though they often serve the same general purpose, namely, to enable the access seeker to have access to the subscriber base of a fixed network operator. For example, while there may be some level of substitution between unbundled local loop service and wholesale line rental, neither can be considered an adequate substitute for carrier preselection or call selection or access to ducts. There are

levels of overlap between the various services falling short of the full or substantial substitutability that would enable them to be considered to be in the same market. Therefore the analysis in this paper proceeds on the basis that each of the services mentioned constitutes a sub-market of the FACO market, and the latter is best considered to be a collection of such sub-markets, all serving a common purpose.

6.3 Competitive assessment

6.3.1 The National Executive Council has indicated on a number of occasions that Kumul (Telikom), DataCo and bmobile will be consolidated under Kumul for improved efficiency in the provision of wholesale and retail services. The assessment herein proceeds on the basis of the service roles that have been given to the three enterprises as of January 2018.

6.3.2 Kumul (Telikom) owns and operates the fixed wireline network in PNG. Local loops are part of its fixed network, the coverage of which is limited to Port Moresby and a limited number of other urban areas within PNG. Consequently Kumul (Telikom) is the only operator currently able to offer ULL and WLR services. Kumul (Telikom) has some dark fibre, and is likely to be the sole operator of dark fibre on routes that it serves. DataCo has two fibre pairs on the LNG Pipeline route of approximately 700 km from the Southern Highlands to near Port Moresby, and access to fibres on the OPGW system of PNG Power Limited. In addition DataCo has ambitious plans to construct additional fibre systems, but has not been able to proceed with these plans because of funding constraints to date. Telikom has access to duct systems that it has installed on legacy and other easements and rights of way. It is open to other licensed operators to purchase easements and to establish their own duct systems should they wish to do so. Other duct system needs, should they exist, may not necessarily be in locations served by Telikom duct systems.

6.3.3 From the information available to it, NICTA understands that there is no sharing of or access to the passive fixed network infrastructure controlled by Telikom and DataCo. Digicel utilises microwave and satellite links for core transmission within its network. Independent ISPs use wireless technologies or leased service capacity to link the sites that they use for service provision.

6.4 Identification of wholesale services for potential declaration

6.4.1 There are many potential wholesale services in the FACO market that could be considered for declaration. These include:

(a) Access to ducts

(b) Access to dark fibre

(c) ULL

(d) WLR

(e) CS/CPS

6.4.2 At this time though NICTA does not believe that any of these services warrant being considered for potential declaration. The reasons for this preliminary conclusion are set out below in respect of each individual service but in general include no evident demand or likelihood of demand, and that *prima facie* declaration would not promote both the efficiency objective and the competition objective.

A. Access to Ducts

6.4.3 It is technically feasible for access to ducts to be provided via a wholesale service declaration. There are too many instances of duct sharing in other jurisdictions to doubt that similar arrangements might not be equally feasible, technically, in PNG. The legitimate commercial interests of the duct provider may be reasonably safeguarded by establishing regulated wholesale pricing that appropriately reflects the risk-adjusted costs associated with operating a duct system in various locations and of being the first-in provider. In many locations it would not be economically efficient for multiple duct systems to be established on the same or very similar routes and therefore the economies of scale and scope through improved utilisation of a single system are considered to be substantial in such circumstances. The prospect of recouping some of the cost of a duct system through wholesale sales is not considered to pose risks to or disincentives for necessary investment.

6.4.4 However the opportunity for wholesale sharing of ducts is available at present and licensed operators may make their own commercial arrangements for sharing where it is perceived to be in their mutual interest to do so. No such arrangements have been advised to NICTA to date, nor has any advice been received of requests for sharing having been denied.

6.4.5 The duct system controlled by Kumul is limited to particular areas within Port Moresby and other urban centres. The fixed network extends to only approximately 150,000 subscribers for the whole of the country and it is likely that the duct system serving these limited local access networks are sub-scale for the purposes of sharing by other licensed operators.

6.4.6 It is important to note that other licensed operators may make direct arrangements with landowners and operators of other public infrastructure and utilities, such as road authorities, power authorities, and so on, to create easements on a commercial basis for the purpose of installing ducting systems. In a limited number of locations such a self-service approach may be the most feasible option.

6.4.7 Given the manner in which competition is playing out across the telecommunications sector generally in PNG, with emphasis on mobile and broadband services, and the non-reliance on access to other operator' duct systems to date, in a practical sense it is inappropriate that access to ducts should be regarded as 'necessary for the promotion of effective competition in at least one other market than the market for the wholesale service (s.128(b)(i) of the Act) There is effectively no competition in the provision of narrowband voice services at fixed locations using copper and cable systems. MNOs are using microwave and other transmission systems for their major network connections rather than ducted transmission. Microwave has capacity limitations that will be exceeded once data traffic increases in PNG as it has in many other developing countries with the further extension of 3G services and the introduction of LTE technology. To date, however, the operators in the market have found substitutes that are preferable in PNG's circumstances than wholesale access to ducts.

As a practical matter, the ducting systems operated by Kumul, where they exist, are limited to some urban environments, and do not cover the intra-network routes required by MNO in any case. For the bulk of their requirements mobile and other retail operators could not have relied on duct solutions in any case.

B. Access to Dark Fibre

6.4.8 Access to dark fibre involves access to fibres or fibre pairs that have not been activated electronically – hence 'dark fibre'. This is to be contrasted with access to broadband capacity provided by the use of fibre transmission. Access to dark fibre and is a form of facility access.

6.4.9 The policy of the PNG Government has been to establish DataCo as a State Owned Enterprise to accumulate and make available for sale at a wholesale level the on-shore fibre assets of government, including the LNP Pipeline fibre communications. This approach does not prevent private investment by other operators in fibre links or fibre systems. DataCo until recently listed access to dark fibre amongst its services and charges PGK 1,500 per kilometre in urban areas and PGK 1,000 in rural areas. However, while it may be open for DataCo to agree to provide access to dark fibre there is no basis on which it must do so.

6.4.10 In terms of the criteria in subsection 124(2) of the Act, it is technically feasible to enable access to dark fibres. DataCo's past offering was and is evidence that it considered the service to be technically feasible. This approach has been permitted and operating in many other countries for years, without interference to the operation or performance of other ICT services provided by the fibre systems involved.

6.4.11 However, DataCo has been established primarily as a provider of wholesale broadband capacity on an ongoing basis. It has a legitimate commercial interest in being able to allocate potentially scarce capacity resources within the PNG wholesale market. Being required to sell or lease fibre on a dark fibre basis may or may not undermine its commercial plans in the longer term. NICTA has not seen these plans and is therefore unable to certify that mandating access to dark fibre is a viable option overall.

6.4.12 If other licensed operators sought to replicate some of the fibre routes operated by DataCo and to establish their own fibre transmission systems along those routes, the result would be likely be inefficient because of the unlimited capacity of individual fibre routes for all practical intents and purposes. The only issue would be the need for route diversity to provide a guarantee of continued operation in the event of a major disruption or outage, and this is a matter that can be largely addressed through fibre network and system design. It would be more efficient in terms of scale economies for such operators to use the fibre networks operated by DataCo. However the result is equally achieved through leasing of broadband capacity as required as it is achieved by access to dark fibre.

6.4.13 Thus in terms of the criteria relating to the efficiency objective in subsection 128(c) of the Act, it seems:

(a) to be unclear whether or not a declaration of dark fibre access would materially compromise the incentives for efficient investment in any facility over which the service might be supplied;

(b) that access to dark fibre is technically feasible; and

(c) that access to dark fibre would avoid inefficient replication of some underlying facilities, although the risk of such replication would be equally reduced or removed by the declaration of broadband capacity services on such routes.

6.4.14 In terms of the competition objective criteria set out in subsection 128(b) of the Act, it seems that:

(a) access to dark fibre is not necessary for the promotion of effective competition in other markets for ICT services because the same results could be achieved through the non-discriminatory supply of broadband capacity (which is separately examined in Chapter 7); and

(b) the service is supplied in whole or in part via a facility that cannot feasibly be substituted, as a matter of commercial reality, via another facility in order to supply that wholesale service, but only so far as the access requirement is between nodes that are supplied by the DataCo fibre network.

C. Access to Unbundled Local Loops (ULL)

6.4.15 Access to ULL involves wholesale access to the physical (copper) connection between the subscriber's premises and a network node of the access provider's network thereby enabling the access seeker to deliver a service to that subscriber. Typically this is from the local exchange to the subscriber's premises.

6.4.16 The fixed local access networks in PNG are very small when compared to the reach of cellular mobile and other wireless systems. There are estimated to be 150,000 PSTN services as at 31 December 2015 (ITU Yearbook 2016), compared to around 3.2 million cellular mobile services.

6.4.17 In terms of the efficiency objective criteria at subsection 124(2) of the Act, it is well established in other jurisdictions how ULL access may be provided technically. However the costs of establishing a system of access to such a small population must be doubted. The costs of planning and system management would need to be recovered over a small population of services. NICTA is not aware of any requests for ULL access by other PNG operators to this point and considers that such requests might become increasingly less likely in the future.

6.4.18 In terms of the criteria relating to the efficiency objective in subsection 128(c) of the Act:

(a) the small market for PSTN services in PNG, suggests that fragmentation of the market through ULL access remains a likely outcome with attendant risks to the incentives for further investment by Kumul (Telikom) as the access provider;

(b) access is technically feasible, subject to further consideration of the reasonableness of the costs involved; and

(c) access to the ULL facility would theoretically avoid inefficient replication of underlying facilities that may be efficiently shared. In this regard it is considered very unlikely that another operator would seek to replicate the fixed copper network or to use the technologies of the PSTN to replicate the service. Fixed wireless solutions are far more

likely to be adopted to provide an equivalent service, as they have been in the recent past.

6.4.19 In terms of the competition objective criteria in subsection 128(b) of the Act, it seems that:

(a) The most immediate other market that would be affected by declaration of ULL access would be the market for the provision of PSTN services (and the delivery of both voice and data services by an alternative operator). In practice in other countries where ULL has been mandated, ULL services are seldom used to replicate only the voice and narrowband services provided under PSTN conditions. The most common use for ULL access services is to provide *x*DSL solutions for delivery of broadband data services. However the demand for such access services is unknown in PNG, but is likely to be limited or non-existent given the mass adoption of cellular mobile services for personal and business communication, including broadband capacity. Certainly NICTA has no evidence that there is any backlog of unmet demand for such wholesale services. Consequently it would seem that ULL access is not necessary for the provision of retail voice and broadband services on an effectively competitive basis in PNG. There appear to be no other markets in PNG in which effective competition is dependent on a declaration of ULL access.

(b) The wholesale ULL service is supplied via a facility (the copper-based local access network) that cannot feasibly be substituted as a matter of commercial reality via another facility. As already noted, no alternative operator would be likely to seek in 2018 to replicate the PSTN local access network. Alternative access arrangements based on wireless technologies would be considered instead.

D. Wholesale Line rental (WLR)

6.4.20 WLR involves the rental of a subscriber line to another operator so that the other operator can provide the PSTN rental service at a retail level. Amongst the possible reasons why the other operator may wish to do this, is to be able to provide a full suite of services in a packaged or bundled manner to the retail customer, and to meet expectations of retail customers preferring a single source of supply for all of their telecommunications service requirements.

6.4.21 The provision of WLR is technically feasible. It involves no more than recognition that a specific subscriber line or set of subscriber lines has been leased to another licensed operator for on-selling to that operator's end customer.

6.4.22 In terms of the criteria at subsection 128(c) of the Act, it seems that:

(a) declaration of WLR would not materially compromise the incentives for investment in any facility over which the service might be supplied. Declaration does not mean that the WLR service is offered at below cost or at charges that do not include a suitable return. The history of subscription services under monopoly conditions has been that the costs of rental of subscriber lines has been subsidised by the revenues from call charges. However, the need to compete with mobile calls has in most countries resulted in the cross-subsidy being substantially or completely unwound. Consequently, the subscriber

line service may now be treated as a stand-alone service at both retail and wholesale levels.

(b) access or increased access to WLR, if declared, is technically feasible for the reasons already mentioned. The service has been declared in many other jurisdictions where no issue of technical feasibility has arisen. The same would apply in PNG.

(c) WLR is not a facilities access service, but declaration will avoid the inefficiency involved if alternative facilities were required to be developed to replicate the service.

6.4.23 In terms of the competition objective criteria at subsection 128(b) of the Act, it seems that access or increased access to WLR, as a consequence of declaration, could be necessary for the promotion of effective competition in at least one market other than the market for WLR itself. That other market would likely the market for retail line rental, which is important if other licensed operators are to be able to replicate the bundles being offered by the access provider – Kumul (Telikom) in this case.

6.4.24 The WLR service is supplied in whole or in part via a facility, namely the local access networks operated by Kumul (Telikom), that cannot feasibly be substituted, as a matter of commercial reality, via another facility in order to supply WLR service. It would not be commercially or economically feasible for another licensed operator to replicate Kumul (Telikom) local access network in any area for the purpose of supplying a service equivalent of WLR to only those customers that wanted a service from that other operator. The economies of scale for fixed access services extend across the whole of the demand, and therefore to fragment that demand is not commercially realistic in most situations. The exception might be where a client is very large and occupies relatively few sites in an urban business district, but these are not the customer circumstances that apply for most of PNG. However, there is no evidence available to NICTA of a demand for bundled services in which fixed access is a component, or of wholesale demand from operators seeking to test whether there is any such demand.

E. Call Selection and Carrier Pre-selection (CS/CPS)

6.4.25 The Minister, acting on NICTA's recommendation, may require the implementation of pre-selection under Part IX of the Act (specifically section 188). That is a separate process from the potential declaration of CS/CPS under Part VI of the Act and would be based in different decision criteria. As section 188 of the Act envisages NICTA giving consideration to the potential implementation of pre-selection on cost/benefit grounds, Annex B of this discussion paper sets out the general costs and benefits of the implementation of pre-selection. This has been done for completeness. NICTA does not believe that formal consideration of the introduction of pre-selection—either by way of a declared service under Part VI of the Act or a rule-making in accordance with section 188 of the Act—is warranted at this time.

6.4.26 Call selection (***CS***) is a service that enables an end user to dial a code to route a call via a particular network operator, rather than the more normal situation where calls are routed over the network to which the subscriber line service is directly connected. When available,

CS is a service used on a call by call basis and relies on exchange-based number analysis of the short codes being used to effect the selection.

6.4.27 Carrier Pre-selection (***CPS***) is a service that enables a standing subscriber preference to be put into effect for call services to be taken from a licensed operator other than the operator supplying the retail access service. Business customers with large outward calling volumes, particularly over long distance national and international routes, may have Private Branch Exchange (***PBX***) equipment that can be programmed for the pre-selection of leased cost routing arrangements based on destination and time of day. The data is included in matrices that are input into the PBX software, and which would be updated for changes in prices from time to time. Individual fixed line customers do not have PBXs or the facility to establish in their own customer equipment least cost routing arrangements. These customers might therefore rely on a CPS facility, if offered, by the provider of their subscription service which is realised through software amendments in the local telephone exchange that serves the customer.

6.4.28 CS and CPS may be provided separately or together. CS can be used to override CPS where the customer finds it desirable or necessary to do so – for example, where the pre-selected call routing service is subject to congestion.

6.4.29 In terms of the efficiency objective criteria in subsection 128(c) of the Act, it seems that declaration of CS and/or CPS would not materially compromise the incentives for efficient investment in any facility over which the wholesale service may be supplied. In the past, prior to substantial unwinding of the cross subsidy provided by call revenues to the cost of subscriber line services, there would have been justification for CS/CPS. However, the competition provided by mobile services for outbound calls, and the subsequent substantial impact of fixed-to-mobile call substitution, have resulted in many more options for accessing cheaper calls. Declaration of CS/CPS would at best be marginal in terms of any impact on investment incentives, and, most likely, irrelevant.

6.4.30 Access or increased access to CS/CPS is technically feasible have regard to the factors in Section 124(2)(a) of the Act. Specifically, the technology available makes the service technically feasible. The technology has been available since the early 1990s, and has been used in countries such as Australia and the United Kingdom. However, the costs involved in establishing a comprehensive system of CS or of CPS for the limited market of fixed services in PNG are not considered or proven to be reasonable.

In relation to the third criteria (in paragraph 124(a)(iii) of the Act) experience elsewhere has shown that there is no effect of supplying the CS/CPS services on the integrity or performance of other ICT services.

6.4.31 In terms of the competition criteria at subsection 128(b) of the Act, it seems unlikely that access or increased access to CS/CPS is necessary for the promotion of competition in other markets. The most obvious other market that would be affected by a CS/CPS declaration is the market for international calls. There is already competition in this market, although how effective it is may be doubted given the high prices for outbound and inbound calling from and to PNG. Participants who are currently in the market for international call services participate on a fully integrated basis. That is, they operate the national network that

delivers the subscriber service as well as the calling services to their customers. As noted in Annex B, some forms of CS are available, particular to business and other multi-line customers with appropriate customer equipment, without the need for a declaration. In addition, the high costs of international calling are the result of many factors, including the settlement charges imposed on PNG carriers by overseas carriers such as Telstra in Australia, and the limited international capacity to and from PNG. Declaration of CS/CPS is neither necessary nor efficient for effective competition in retail international call markets.

The CS/CPS service is supplied via a facility that cannot feasibly be substituted as a matter of commercial reality via another facility. The only alternative would be to require the access seeker to build out a complete network to its proposed customers. Given the nature of fixed networks this is not economically feasible. The potential number of mobile networks in PNG is limited by spectrum allocation considerations in PNG, and this route is also economically infeasible for an operator that wants to provide a call routing option but not a full service.

6.5 Preliminary conclusions

6.5.1 NICTA proposes to conclude that:

(a) there is a national FACO market and that Kumul has a position of substantial market power in that market; and

(b) no potential wholesale services in that market (or its sub-markets) warrant being considered against the declaration criteria at this time.

6.5.2 For clarity, this means than NICTA *does not* currently propose to recommend that any of the following services be made declared services:

(a) Access to ducts;

(b) Access to dark fibre;

(c) ULL;

(d) WLR; and

(e) CS/CPS

7 The market for wholesale broadband capacity

7.1 Background

7.1.1 This market is important for retail service providers to enable their customers to have high-speed access to the internet. Wholesale broadband capacity services will become increasingly important as reliance on online services and internet access increases in PNG in the future for social and economic inclusion, as is occurring in all other countries. It will become particularly important in future for businesses and individuals in PNG to have access to competitive broadband services to interact with each other socially and in economic terms, and to enable them to participate fully and effectively in an increasingly online world.

7.2 Relevant Market

7.2.1 Wholesale broadband capacity services involve conveyance of high speed internet traffic to a point of presence for handover to an Internet Service Provider (***ISP***). This wholesale service is commonly known as "bitstream" or "bitstream access".

7.2.2 Wholesale broadband capacity services include the provision of broadband capacity using a range of technologies, such as optic fibre, satellite and microwave. For present purposes we are only concerned with fibre-based capacity. Fibre technology is able to provide much greater capacity and data speeds than the other technologies mentioned, and at the wholesale level they are only partial substitutes. Importantly, satellite and microwave capacity can be installed in manageable increments, and are economic to replicate. In addition they are capable of relocation at affordable cost, which may not be an option for fibre which is buried or attached to fixed aerial supporting infrastructure (such as tower lines).

7.3 Competitive assessment

7.3.1 The National Executive Council has indicated on a number of occasions that Kumul (Telikom), DataCo and bmobile will be consolidated under Kumul for improved efficiency in the provision of wholesale and retail services, with DataCo being the single source of wholesale broadband capacity within the group. The assessment herein proceeds on the basis of the service roles that have been given to DataCo as of January 2018. DataCo has control and management of the majority of fibre assets in the country, and hence has substantial power in the relevant wholesale capacity services market.

7.3.2 The Government's policy does not prevent the ownership and utilisation of fibre systems and other broadband assets by private sector licensees, such as Digicel. However the costs of replicating fibre and other broadband links to international gateways is high, and may not be economically efficient if fibre capacity is made available on fair and reasonable wholesale terms. Further, as data communication needs and as data traffic increase the current transmission systems will need to be replaced. For example, Digicel relies heavily on microwave for its backbone network transmission. Microwave systems have increased in

capacity over the years, but the likely increases in data traffic that will accompany further rollout of 3G and LTE mobile networks, together with improved high speed internet capacity in submarine cable networks will demand that fibre replace radiocommunications as the primary means of backbone network transmission.

7.4 Identification of wholesale services for potential declaration

7.4.1 NICTA proposes that consideration be given to the declaration of a wholesale broadband service.

7.4.2 The proposed definition of that particular service is set out in the draft declaration instrument at Annex E. The declaration has been limited to wholesale broadband capacity from fibre systems — a technological limitation — because as a practical matter the use of the declaration to gain mandatory wholesale access will be limited to broadband services provided by such systems in any case. The declaration therefore is in terms that provide clear guidance. Access seekers will typically need much more capacity than they can obtain from services based on other technologies — and may already have access to such sources of capacity already — at charges that are becoming increasingly prohibitive for competition in retail markets.

7.5 Consideration of the proposed wholesale service declaration

7.5.1 The proposed terms of the declaration of the wholesale broadband service are set out in the draft declaration at Annex E. In short, it is proposed to be defined as a wholesale Network Service for the carriage of broadband traffic between two points of interconnection. This would automatically include carriage over a national submarine cable system in the event that DataCo's public plans for such a system are realised.

Efficiency objective

7.5.2 The economically efficient use of and economically efficient investment in fibre systems will be promoted by the declaration of wholesale broadband capacity. Fibre systems are capital intensive services that have capacity that is potentially limited only by the capacity of terminal electronics, which have been subject to rapid technological development over the past 30 years. There is no reason for duplication of fibre systems other than for security and diversity, but the meshed nature of such systems enables these requirements to be largely met within single systems.

7.5.3 Therefore, to impose mandatory access requirements in fibre system operators to provide access to broadband capacity will enable other network operators to have broadband capacity without the need to construct their own separate networks. Wholesale access will enable the sector to avoid inefficient investment into unnecessary duplicated systems.

7.5.4 Wholesale broadband capacity is well established in many other countries at reasonable cost, and without adversely affecting the integrity, operation or performance of other ICT services provided by other operators in the same way. It is clearly technically feasible.

7.5.5 The commercial interest of access providers such as DataCo, which has a wholesale mandate from the PNG Government, will necessarily be enhanced, because its business case rests upon exploiting economies of scale and scope in the provision of wholesale broadband to provide such services efficiently on a national basis. Declaration of wholesale broadband services, far from compromising the incentives for investment, is fully consistent with sustaining investment incentives in this instance.

Competition objective

7.5.6 Access or increased access to wholesale broadband services as a consequence of declaration is necessary for effective competition in retail broadband service markets, both fixed and mobile. If only one of the vertically-integrated operator groups in PNG has access to existing fibre systems with the capacity to carry the expected substantial increases in data traffic in the near future, then other operators will be forced to replicate the investment, or become less competitive. There is every reason to doubt that, absent a declaration, a wholesale broadband market with fair and reasonable access (including price) terms will develop in PNG – especially given that such developments have generally not occurred in other countries.

7.5.7 As already discussed, wholesale broadband service is supplied on fibre systems that cannot feasibly be substituted by microwave, satellite or other alternative systems that, comparatively speaking, are severely capacity constrained and which are, as a matter of commercial reality, not substitutable, given the increasing cost differential for each unit of broadband capacity.

7.6 Preliminary conclusions

7.6.1 NICTA proposes to conclude that:

(a) there is a national market for wholesale broadband capacity services and that Kumul (DataCo) has a position of substantial market power in that market; and

(b) the declaration of the wholesale broadband capacity service on the proposed terms set out in Annex E would satisfy the declaration criteria.

8 The market for wholesale leased lines services

8.1 Background

8.1.1 Wholesale leased line services are dedicated services between two network locations or between a network location and customer premises that are provided by a wholesale operator to a retail operator. They are used to complete the provision of a retail telecommunications service by the retail operator to its end-customer, almost always a business or government end customer.

8.1.2 Typically wholesale leased lines are of two types. They may be trunk segments, between network nodes in the wholesale operator's network, or they may be terminal segments that extend between a network node in the wholesale operator's network to a point nominated by the retail operator. The latter point may be a node in the retail operator's network or at a network boundary point in the end-customer's premises. Trunk and terminal segments may be ordered separately or individually as required, depending on the transmission links that the retail operator is able to provide for itself and the leased line services it needs from a wholesale source.

8.1.3 Wholesale leased lines can be provided on any transmission medium, whether wireless, cable or fibre. Historically they have been provided using copper cabling technologies by incumbent fixed operators.

8.2 Relevant Market

8.2.1 Kumul's (Telikom) website indicates that retail leased line services are available but provides no details of the technical characteristics or the terms and conditions that apply. Telikom has not published or provided to NICTA any indication of the number and types of leased lines that it has provided to retail customers. The same applies in the case of wholesale leased lines services, if any, that may be provided.

8.2.2 NICTA is not aware of any level of satisfied or unsatisfied demand for wholesale leased line services in PNG. No operator has advised that they have been able or unable to acquire such services from Kumul (Telikom). NICTA has no records of complaints from other licensed operators that may have sought and been denied wholesale leased line services from Telikom.

8.2.3 Based on the available evidence, NICTA is not able to conclude that there is any market at all for wholesale leased lines in PNG beyond self-supply, whether for voice, data or multi-mode usage. It is likely that service providers such as independent ISPs are taking services that incorporate non-dedicated transmission characteristics, and that operators (other than Kumul (Telikom)) are not offering retail leased line services at all or retail services that are based on wholesale leased lines.

8.3 Identification of wholesale services for potential declaration

8.3.1 Under the circumstances, NICTA does not propose to consider the potential declaration of wholesale leased lines at this time. NICTA may consider this matter if any material level of demand for wholesale leased line access arises in future. Although NICTA believes that the market developments generally suggest a movement away from reliance on wholesale services involving dedicated point-to-point transmission, and, consequently, the time at which a demand for wholesale leased services might have become manifest is past.

8.4 Preliminary conclusion

8.4.1 NICTA proposes to conclude that:

(a) there is neither a current nor potential market for wholesale leased lines in PNG; and

(b) the circumstances do not warrant a wholesale leased line service being considered against the declaration criteria at this time.

ANNEX A: INQUIRY TERMS OF REFERENCE

Under the authority of section 127 of the *National Information and Communications Technology Act 2009* (***the Act***), NICTA has decided to inquire into and report on whether certain wholesale services in Papua New Guinea should be declared under section 130 of the Act. In doing so, NICTA will:

(a) analyse the extent of competition in domestic telecommunications markets with a particular focus on the geographical areas outside the provincial capitals where practicable and appropriate; and

(b) form a view as to whether or not those markets are effectively competitive; and, if any is not,

(c) consider whether the declaration by the Minister of any particular wholesale service or services in that market would satisfy the declaration criteria specified in section 128 of the Act; and

(d) determine whether or not NICTA should recommend to the Minister that one or more wholesale services in that market be declared under section 130 of the Act; and, if such a recommendation should be made, and

(e) specify the recommended terms of the declaration(s) and the recommended expiry date(s) for any such declaration(s).

ANNEX B: COSTS AND BENEFITS OF CALL SELECTION AND CARRIER PRE-SELECTION

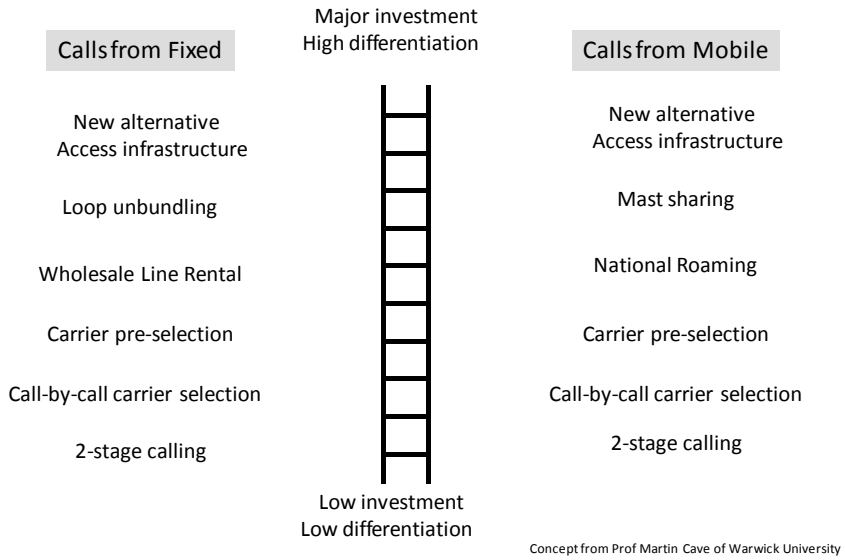
B.1 The scope of the services

The purpose of this Annex is to review the costs and benefits of Carrier Selection (CS) and Carrier Pre-Selection (CPS), which would enable callers to make long distance, and especially international, calls via alternative operators who do not provide the caller's own fixed or mobile access network.

The different ways of providing for this to happen are commonly viewed as a ladder of investment (it could also be called a ladder of regulation) - a concept formulated by Prof Martin Cave.[23] The concept is that the alternative supplier enters the market with limited capital to invest and some uncertainty about the success of the future business. They provide an initial service with minimal regulatory support and lowest costs for the access operators (typically the first step is call by call carrier selection) and then if the business grows they attract more investment and move up the ladder using CPS, and then later Wholesale Line Rental and then Local Loop Unbundling.[24]

Figure B-1 shows the Ladder of Investment for fixed and mobile access.

Figure B-1: Ladder of Investment for fixed and mobile access



The purpose of mentioning the ladder is to set the roles of CS and CPS into a more general context.

[23] Encouraging infrastructure competition via the ladder of investment: Original Research Article *Telecommunications Policy*, Volume 30, Issues 3–4, April–May 2006, Pages 223-237

[24] Both Wholesale Line Rental and Local Loop Unbundling are discussed separately in Chapter 6 of this Report

Call by call carrier selection with a short code prefix (CS)

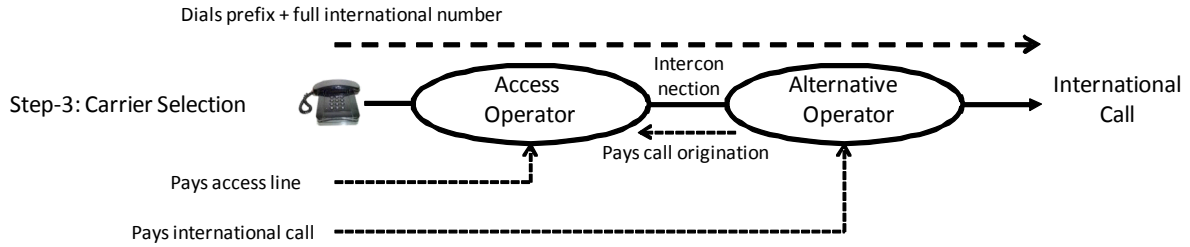
This is the common form of call by call carrier selection. The caller dials a short code (prefix) of 2-5 digits in front of the caller number without any pause and the access network routes the call to an alternative operator indicated by the short code.

The common arrangement is that:

- the connection of the alternative operator to the access operator is an interconnection point and not a form of business access
- the caller pays the alternative operator for the whole call and the alternative operator pays the access operator for the call access at a regulated call origination rate.

Figure B-2 shows the arrangement.

Figure B-2: Call by call carrier selection



In the 1990s, Germany used a variant of call by call selection where the access operator did the billing for the whole call and paid the alternative operator removing the need for the caller to have an account with the alternative operator. This arrangement was not liked because the alternative operators wanted to have a relationship with the caller. It also produced large swings of traffic that were difficult to manage when TV advertising generated large but short term volumes of calls via different alternative operators causing congestion in different parts of the access network.

Call by call carrier selection has been used in many countries for fixed access but seldom for mobile. The reason is that mobile services are usually provided on a national basis with uniform pricing irrespective of whether calls are made to mobile handsets that are geographically proximate or distant. In most countries mobile services are offered on a competitive basis and have been so offered for many decades. This means that carrier selection has not been seen to be necessary to provide choice or to remove the market power of an established incumbent mobile operator. In addition it has been relatively easy for subscribers to establish multiple mobile services so that they can exploit price promotions and offerings by one or other of the mobile operators from time to time. Multi-SIM handsets have facilitated this.

Call by call carrier selection was popular in the case of fixed services in the mid to late 1990s when fixed incumbent operators came under increasing challenge around the world, especially in relation to long distant services that had been a source of cross-subsidy and remained overpriced. Excess profits were quickly competed away in most countries through the entry of new competitors, including service-based operators. Fixed location voice services were at the time considered to be a natural monopoly. Carrier selection offered subscribers to these services choices for accessing better prices for long-distance services, and also offered service-based operators a means of accessing the fixed incumbent's customer base.

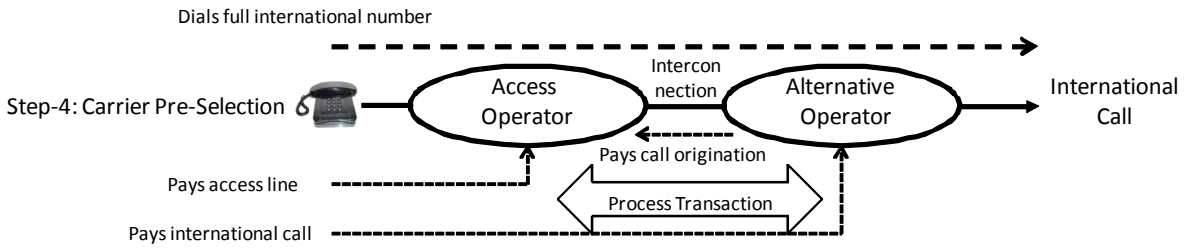
Carrier pre-selection (CPS)

CPS is a more permanent version of call by call carrier selection where the caller's choice of alternative operator for a particular class of calls is stored in the access network and the caller does not need to dial a prefix. This arrangement requires an ordering process between the alternative operator and the access operator with a transaction for each caller who requests the service. A further transaction would be required to remove carrier pre-selection or to change the selection to another alternative operator. The process between the operators is similar to that for number portability. For the caller dialling appears the same as without any carrier selection.

Carrier pre-selection has been used in many countries for fixed access but almost never for mobile, for the reasons already set out above in relation to call by call carrier selection.

Figure B-3 shows the arrangement.

Figure B-3: Call by call carrier selection



B.2 Benefits of CS/CPS Services

Both CS and CPS enable a user of one network to make a certain class of calls via another network. The difference between CS and CPS is that:

- with CS the user needs to dial a prefix in front of the called number for each call and
- with CPS they do not but instead they need to set-up an arrangement where all calls of a certain class are routed by a chosen alternative operator. The pre-selection can normally be over-ridden call by call by dialling a prefix.

Thus CPS is easier for the regular user to use.

CS can be made easier to use by:

- Storing the prefix together with the number for frequently called numbers (fixed and mobile terminals)
- Programming private business switches to add the prefix to the dialled number automatically (fixed access only)
- Using an auto-dialler between the telephone and the network termination socket to add the prefix to the dialled number automatically (fixed access only).

The benefits of CS and CPS are cheaper out-going calls to a certain class of number. In PNG they would only be likely to be used for calls to international numbers where the existing tariffs are high (roughly twice the regional average) and the margin is sufficient for an alternative operator to pay the access network for access, cover its own costs in delivering the call and still make a profit.

Alternative operators can deliver international calls relatively cheaply if they use the Internet for the international transmission of the calls. In contrast the tariffs for national calls do not have sufficient margin to make CS/CPS attractive.

Both CS and CPS would enable:

- Existing operators to compete with each other for international calls without the user having to change operator for all calls.
- New operators to enter the market and compete for international calls without having to invest in an access network. There may be several small alternative organisations who are already offering such services using 2-stage dialling and CS/CPS would enable them to compete more easily and on a larger scale.

The benefits of CS and CPS are similar in that the main benefit is cheaper calls. Cheaper calls would enable more people to make international calls and lead to higher volumes of such calls.

The benefits differ slightly between CS and CPS in terms of ease of use depending on the terminal equipment used and depending on whether or not a user wants to user several different alternative networks depending on the current best offer, which favours CS, or make a single longer term choice, which favours CPS.

The extent of the benefits achieved will depend on the extent to which CS/CPS is used. This in turn depends on whether there are operators wanting to use CS/CPS to offer cheaper international calls and the number of subscribers who could use them. There is no evidence of a demand for this kind of service in PNG at either retail or wholesale level, although NICTA is well aware of on-going concerns about the high cost of international calling.

CS/CPS were designed originally for fixed networks and with very few exceptions requirements to support CS/CPS have been applied only to fixed networks. In PNG there are only around 150,000 fixed network subscribers, all provided by the same network. The majority of calls are made from mobile phones. Mobile subscriptions now exceed 3.2 million.

CS/CPS could also be applied to calls from mobiles provided that the prefix is kept sufficiently short. However there is no evidence that mobile users would adopt this kind of service in PNG.

The comments above refer to the absolute benefit of CS/CPS, which are cheaper calls and greater call volumes. Introducing a regulatory requirement for CS/CPS is not the only way to provide access to cheaper calls, such access is already possible using 2-stage dialling, see Attachment 1.

B.3 Costs of CS/CPS Services

The levels of costs for CS are given in Figure B-4.

Figure B-4: Overview of costs of carrier selection

Cost item	Explanation	Cost level
Establishment of the requirement	The engineering and network costs for establishing a capability for CS are low. Administrative and legal costs may be much higher, especially in the absence of a consensus on the value of introducing the service.	Low/medium setup cost
Network modifications	The switches used by the operators most likely already support call by call carrier selection but there may be additional charges for enabling this part of the software.	Low/medium setup cost
Interconnection	Existing operators already have interconnection arrangements and they would need to be extended to include carrier selection and its billing.	Low setup cost
Setting the call origination charge	NICTA will need to set the rate for the call origination charge. Although call origination is technically similar to call termination, but with the direction of the call reversed, there is no benefit to the access operator who will have an incentive to maximise this charge.	Low setup cost

For CS the running costs are the call origination payments, and maintenance.

The cost levels of CPS are given in Figure B-5.

Figure B-5: Overview of carrier pre-selection costs

Cost item	Explanation of additional costs of CPS compared to CS	Cost level
Establishment of the requirement	The engineering and network costs of introducing the capability are greater than for CS. Administrative and legal costs are likely to be greater as well.	Medium setup cost
Network modifications	It is less likely that the mobile network switches would already support CPS. If they do then the costs of enabling the facility would be higher. If they do not then the cost of developing the additional software would be very high	Medium to very high setup cost
Interconnection	Same as for CS	Low / medium setup cost
Setting the call origination charge	Same as for CS	Low setup cost
Transaction process	The process would have to be specified in detail and implemented with the access operators having to introduce new staff procedures for each subscriber who chooses or modifies CPS. The procedure will have to be tested before launch. Development would take up to 6 months	Medium setup cost

For CPS the running costs are the same as CS plus the costs of the transactions when each subscriber chooses or modifies CPS.

B.4 Costs and benefits compared

Although the cost levels have been described above in general terms, it is clear that the introduction of either or both CS and CPS services in PNG will result in material costs being borne by the network operators that provide the service. Typically CS/CPS Services have been provided in the past by fixed network operators only, often before a time when software controlled digital switching was ubiquitous. The high costs of CS/CPS service introduction in the early 1990s would no longer apply. However, despite that, costs for introducing these services would be material. Therefore, if NICTA were to consider the obligatory introduction of such services in PNG it would seek to identify very clear and material benefits to ensure that there is a net economic benefit in doing so.

The prospective benefits for introducing CS/CPS services for fixed network services are extremely modest. Local and national call prices are constrained in practice by the mobile alternative. Business customers with multiple lines and PBX or similar equipment could have least cost and other options as set out in Attachment 1, which do not require regulatory intervention. These options apply also for international outbound calls. It is difficult to see how the incremental benefits, over and above those currently on offer via non-regulated means, would exceed the costs of establishing and operating CS/CPS services.

B.5 Conclusion

NICTA does not propose to consider the introduction of CS/CPS in PNG further at this time.

Attachment 1 to Annex B: Means of providing access to alternative operators without the same degree of regulatory intervention

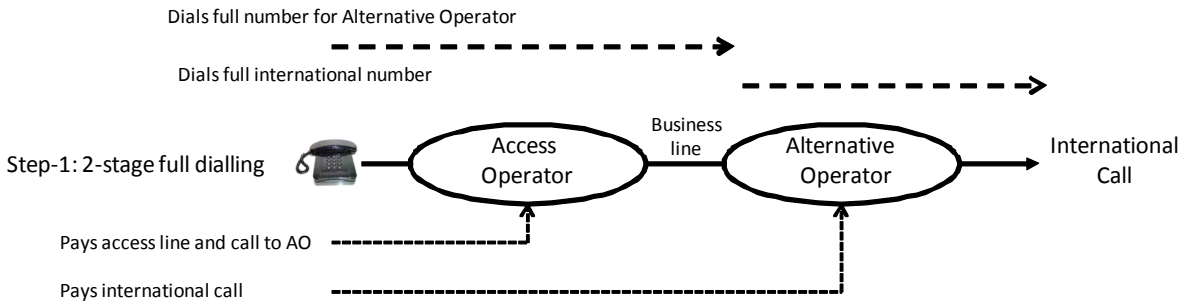
2-stage full dialling call by call carrier selection

The alternative supplier connects to the access operators via a normal multi-line connection such as would be used for a PBX and pays normal connection and line rental charges. The connection may be just to the fixed network, in which case callers from mobile network access the service via the fixed network, or there may be separate connections also to the mobile networks.

The callers register their numbers with the alternative supplier and arrange payments either by pre-pay or monthly billing. Callers dial the full normal number of the alternative supplier, who either checks their CLI that they are a valid customer of requests a secret code (normally used with scratch card pre-pay sales) and then the caller dials the international number to be called, so two full length numbers have to be dialled for each international call. The caller pays the access operator the retail rate for the call to the alternative supplier and separately pays the alternative supplier for the international call.

Figure B-6 shows the arrangement. It does not require regulatory measures to be imposed on the access provider.

Figure B-6: 2-stage full dialling

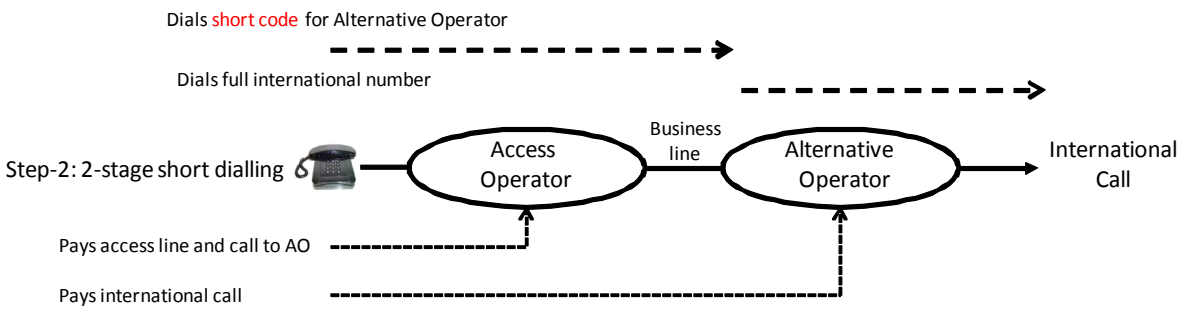


2-stage dialling call by call carrier selection with a short code

This is the same as above except that the call across the access network is made using a special short code. This is not a service that is commonly offered but could be required by regulation and the retail price of the calls to the short code could be regulated.

Figure B-7 shows the arrangement.

Figure B-7: 2-stage short code dialling



Annex C – Draft Declaration of Submarine Cable Services

DRAFT WHOLESALE SERVICE DECLARATION NO. [X] OF 2018

National Information and Communications Technology Act 2009

The MINISTER FOR COMMUNICATIONS AND INFORMATION TECHNOLOGY makes this declaration under section 130 of the *National Information and Communications Technology Act 2009*.

Dated [*DATE*]

[DRAFT NOT FOR SIGNATURE]

Sam Basil
Minister for Communications and Information Technology

PART I – PRELIMINARY

1 Name of Declaration

This Declaration is Wholesale Service Declaration No.[x] of 2018.

2 Commencement

(1) This Declaration commences 30 calendar days after the date on which it is notified in the National Gazette (***the Commencement Date***).

(2) This Declaration expires on the day before the fifth anniversary of the Commencement Date unless it is varied or revoked earlier in accordance with section 130 of the Act.

3 Definitions

(1) Subject to subsection (2), unless the context otherwise requires, terms used in this Declaration have the same meaning as in the Act.

(2) In this Declaration, unless the context otherwise requires:

(a) ***"Act"*** means the *National Information and Communications Technology Act, 2009* and includes any regulations made under that Act;

(b) ***"beach manhole"*** means an underground chamber in which a sea cable is jointed to a terrestrial cable;

(c) ***"cable landing station"*** is:

(i) a Site at which an international fibre-optic submarine cable is available on shore for the purpose of accessing transmission capacity on the cable; and

(ii) includes buildings housing the line terminal equipment.

For the avoidance of doubt this includes the cable landing stations located at Ela Beach and Madang;

(d) ***"duct"*** means an underground conduit that is used, installed ready to be used, or intended to be used to hold a terrestrial cable that connects a Beach Manhole to a Cable Landing Station;

(e) ***"end point"*** means a nominal point at a Cable Landing Station or international gateway Switching Centre in a foreign jurisdiction that is used to demarcate an end of a service, normally if it is supplied in the form of a full circuit;

(f) ***"mid point"*** means a nominal point along an international fibre-optic submarine cable that is used to demarcate an end of a service, normally if it is supplied in the form of a half circuit;

(g) ***"point of interconnection"*** means a location in Papua New Guinea which is a physical point of demarcation between the Access Seeker's Network and the Access Provider's Network.

NOTE: The following terms are defined in the Act:

- Access
- Access Provider
- Access Seeker
- Facilities Access Service
- International Gateway
- Network
- Network Service
- Operator Licensee

- Resale Service
- Site
- Switching Centre
- Wholesale Service

PART II – SUBMARINE CABLE TRANSMISSION CAPACITY SERVICE

4 Declaration of service

The international submarine cable transmission capacity service is hereby declared.

5 Service description

(1) The international submarine cable transmission capacity service is a Network Service:

(a) for the carriage of any combination of voice communications and/or data via an international fibre-optic submarine cable between:

(i) any of the following Points of Interconnection:

(A) a Point of Interconnection located at the Access Provider's Cable Landing Station; or

(B) a Point of Interconnection located in the Access Provider's Switching Centre that is nearest to that Cable Landing Station and which contains a Point of Interconnection between the Access Provider and an Operator Licensee; or

(C) a Point of Interconnection located in the Access Provider's Switching Centre the use of which for this purpose is mutually agreed to by the Access Provider and the Access Seeker; and

(ii) a Mid Point or End Point; and

(b) with any unit of transmission capacity.

(2) For the avoidance of doubt:

(a) the international submarine cable transmission capacity service and the international submarine cable gateway access service are separate Wholesale Services;

(b) the international submarine cable transmission capacity service may be supplied as either a Resale Service or otherwise;

(c) the international submarine cable transmission capacity service includes the supply of backhaul transmission capacity by the Access Provider to the extent that such is necessary to connect an Access Seeker's Facilities at a virtual colocation Site in the relevant Switching Centre to the Access Provider's Facilities in a Cable Landing Station;

(d) if an Access Provider supplies an international submarine cable transmission capacity service with a particular transmission capacity from:

(i) a Cable Landing Station that is under its control; or

(ii) a Switching Centre that is under its control;

then, subject to the constraints of the relevant submarine cable capacity available through contract or ownership to the Access Provider, the Access Provider shall be deemed to be able to supply international submarine cable transmission capacity services with different transmission capacities to Access Seekers with different international capacity requirements.

PART III – SUBMARINE CABLE GATEWAY ACCESS SERVICE

6 Declaration of service

The international submarine cable gateway access service is hereby declared.

7 Service description

(1) The international submarine cable gateway access service is a Facilities Access Service that provides an Access Seeker with such access to, or use of, the Facilitates of an Access Provider at the Access Provider's:

(a) Cable Landing Station; or

(b) Switching Centre that is nearest to the relevant Cable Landing Station and which contains a Point of Interconnection between the Access Provider and an Operator Licensee; or

(c) Switching Centre the use of which for this purpose is mutually agreed by the Access Provider and the Access Seeker;

as is necessary to enable the Access Seeker to interconnect its Facilities to an international fibre-optic submarine cable.

(2) For the avoidance of doubt:

(a) the international submarine cable gateway access service enables an Access Seeker to:

(i) Access the International Gateway Facilities of an Access Provider including, but not limited to, physical network infrastructure;

(ii) physically collocate its Facilities if technically feasible in any available space within the Access Provider's Cable Landing Station;

(iii) virtually or physically collocate its Facilities if technically feasible in any available space within the Access Provider's relevant Switching Centre.

PART IV – SUBMARINE CABLE DUCT ACCESS SERVICE

8 Declaration of service

The international submarine cable duct access service is hereby declared.

9 Service description

The international submarine cable duct access service is a Facilities Access Service that provides an Access Seeker with such access to, or use of, a Beach Manhole and its associated Ducts so as to enable the Access Seeker to connect an international fibre-optic submarine cable to a Cable Landing Station controlled by the Access Provider.

Annex D – Draft Declaration of Wholesale Voice Call Termination Services on Individual Fixed and Mobile Networks

DRAFT WHOLESALE SERVICE DECLARATION NO. [X] OF 2018

National Information and Communications Technology Act 2009

The MINISTER FOR COMMUNICATIONS AND INFORMATION TECHNOLOGY makes this declaration under section 130 of the *National Information and Communications Technology Act 2009*.

Dated [*DATE*]

[DRAFT NOT FOR SIGNATURE]

Sam Basil
Minister for Communications and Information Technology

PART I – PRELIMINARY

1 Name of Declaration

This Declaration is *Wholesale Service Declaration No.[x] of 2018*.

2 Commencement

(1) This Declaration commences 30 calendar days after the date on which it is notified in the National Gazette (***the Commencement Date***).

(2) This Declaration expires on the day before the fifth anniversary of the Commencement Date unless it is varied or revoked earlier in accordance with section 130 of the Act.

3 Revocation

This Declaration revokes *Wholesale Service Declaration No.1 of 2014*.

4 Definitions

(1) Subject to subsection (2), unless the context otherwise requires, terms used in this Declaration have the same meaning as in the Act.

(2) In this Declaration, unless the context otherwise requires:

(a) ***Act*** means the *National Information and Communications Technology Act, 2009* and includes any regulations made under that Act;

(b) ***call*** means a continuous communication;

(c) ***cell*** means the geographic area served by a base station;

(d) ***B-party*** means a retail customer located in Papua New Guinea to whom a call is made;

(e) ***fixed network*** means a network that is not a mobile network;

(f) ***mobile network*** means a network that:

(i) comprises multiple base stations that transmit and receive radiocommunications to and from apparatus of a B-party located in a Cell associated with each base station; and

(ii) detects the customer equipment within which the Cell is located and causes the base station in that Cell to transmit and receive Calls to and from that customer equipment; and

(iii) enables Calls to continue without interruption when such apparatus moves between Cells;

(g) ***point of interconnection*** is a location in Papua New Guinea which is a physical point of demarcation between the access seeker's network and the access provider's network.

NOTE: The following terms are defined in the Act:

- Access Provider
- Access Seeker
- Communication
- Facilities
- Facilities Access Service
- Interconnection
- Network
- Network Service

- Retail Customer
- Wholesale Service

PART II – MOBILE TERMINATING ACCESS SERVICE

5 Declaration of service

The mobile terminating access service is hereby declared.

6 Service description

(1) The mobile terminating access service:

(a) is a Network Service for the carriage of any combination of:

(i) voice Communications; and/or

(ii) short messaging services,

from a Point of Interconnection, or potential Point of Interconnection, to any B-party connected to the Access Provider's Mobile Network; and

(b) includes such Facilities Access Services as are necessary to enable the Access Seeker to interconnect its Facilities to the Facilities of the Access Provider at Points of Interconnection.

(2) For the avoidance of doubt, the mobile terminating access service applies to the termination of Calls and short messaging services on a Mobile Network situated Papua New Guinea regardless of whether those Communications were originated inside or outside Papua New Guinea.

PART III – FIXED TERMINATING ACCESS SERVICE

7 Declaration of service

The fixed terminating access service is hereby declared.

8 Service description

The fixed terminating access service:

(a) is a Network Service for the carriage of any combination of voice Communications from a Point of Interconnection, or potential Point of Interconnection, to any B-party connected to the Access Provider's Fixed Network; and

(b) includes such Facilities Access Services as are necessary to enable the Access Seeker to interconnect its Facilities to the Facilities of the Access Provider at Points of Interconnection.

(2) For the avoidance of doubt, the fixed terminating access service applies to the termination of Calls on a Fixed Networks situated in Papua New Guinea regardless of whether those Communications were originated inside or outside Papua New Guinea.

Annex E – Draft Declaration of Mobile Tower Sharing Services

DRAFT WHOLESALE SERVICE DECLARATION NO. [X] OF 2018

National Information and Communications Technology Act 2009

The MINISTER FOR COMMUNICATIONS AND INFORMATION TECHNOLOGY makes this declaration under section 130 of the *National Information and Communications Technology Act 2009*.

Dated [*DATE*]

[DRAFT NOT FOR SIGNATURE]

Sam Basil
Minister for Communications and Information Technology

PART I – PRELIMINARY

1 Name of Declaration

This Declaration is *Wholesale Service Declaration No.[x] of 2018*.

2 Commencement

(1) This Declaration commences 30 calendar days after the date on which it is notified in the National Gazette (***the Commencement Date***).

(2) This Declaration expires on the day before the fifth anniversary of the Commencement Date unless it is varied or revoked earlier in accordance with section 130 of the Act.

3 Definitions

(1) Subject to subsection (2), unless the context otherwise requires, terms used in this Declaration have the same meaning as in the Act.

(2) In this Declaration, unless the context otherwise requires:

(a) ***Act*** means the *National Information and Communications Technology Act, 2009* and includes any regulations made under that Act;

(b) ***Mobile Tower*** means any physical structure in Papua New Guinea, be it a tower, pole, mast or other structure, upon which antennae and other active electronic components of a mobile communications network are situated.

NOTE: The following terms are defined in the Act:

- Access Provider
- Access Seeker
- Wholesale Service

PART II – MOBILE TOWER SHARING SERVICE

4 Declaration of service

The mobile tower sharing service is hereby declared.

5 Service description

The mobile tower sharing service is a Wholesale Service in which space on a Mobile Tower owned or operated by the Access Provider is leased to the Access Seeker so that it may situate antennae or other network equipment for the provision of mobile communication services within Papua New Guinea.

Annex F – Draft Declaration of Wholesale Broadband Capacity Services

DRAFT WHOLESALE SERVICE DECLARATION NO. [X] OF 2018

National Information and Communications Technology Act 2009

The MINISTER FOR COMMUNICATIONS AND INFORMATION TECHNOLOGY makes this declaration under section 130 of the *National Information and Communications Technology Act 2009*.

Dated [*DATE*]

[DRAFT NOT FOR SIGNATURE]

Sam Basil
Minister for Communications and Information Technology

PART I – PRELIMINARY

1 Name of Declaration

This Declaration is *Wholesale Service Declaration No.[x] of 2018*.

2 Commencement

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(2) This Declaration expires on the day before the fifth anniversary of the Commencement Date unless it is varied or revoked earlier in accordance with section 130 of the Act.

3 Definitions

(1) Subject to subsection (2), unless the context otherwise requires, terms used in this Declaration have the same meaning as in the Act.

(2) In this Declaration, unless the context otherwise requires:

(a) ***Act*** means the *National Information and Communications Technology Act, 2009* and includes any regulations made under that Act;

(b) ***Layer 2 bitstream service*** means a Layer 2 Ethernet bitstream service. For the purpose of this definition ***Layer 2*** has the same meaning as in the Open System Interconnection (OSI) Reference Model for data exchange.

(c) ***Layer 3 network service*** means a Layer 3 service with internet protocol**.** ***Layer 3*** has the same meaning as in the Open System Interconnection (OSI) Reference Model for data exchange.

(d) ***point of interconnection*** is a location in Papua New Guinea which is a physical point of demarcation between the access seeker's network and the access provider's network.

NOTE: The following terms are defined in the Act:

- Access Provider
- Access Seeker
- Interconnection
- Network
- Network Service
- Wholesale Service

PART II – WHOLESALE BROADBAND CAPACITY SERVICE

4 Declaration of service

The wholesale broadband capacity serviceis hereby declared.

5 Service description

(1) The wholesale broadband capacity serviceis a Network Service for the carriage of broadband traffic on a Network within Papua New Guinea and involves the provision of a Layer 2 bitstream service or a Layer 3 network service from a Point

of Interconnection, or potential Point of Interconnection, to either a second Point of Interconnection or potential Point of Interconnection.

(2) For the avoidance of doubt, the wholesale broadband capacity service:

(a) may carry high speed data traffic between different Networks or to an international gateway in Papua New Guinea; and

(b) shall be a service provided via optic fibre transmission.
