

Broadband Interconnection -
A Response to the Consultation of OFTA, 3 November 1999

from

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1. Introduction

The shift from a narrowband world to a broadband world implies more than just a shift to a new technology, it involves the decline of business models associated with narrowband economics and markets, but an uncertainty associated with future markets, costs and revenues. In previous cycles of investment associated with 'new' telecommunications technologies, for example the shift from analogue to digital, the use of communications satellites, and the shift to mobile cellular technologies, future markets were fairly well forecast, although in some cases under-forecast. Market shares of particular companies were uncertain, but overall telecoms engineers, marketers, cost accountants, and others could plan with reasonably high degrees of certainty, and consequently future revenues and costs were, within limits, also able to be forecast.

Equally, 'opportunity costs' could therefore also somewhat be forecast. This had policy implications, because government regulators could estimate the likely impact on risk and return of certain policy and regulatory courses of action. For example, the Government of Hong Kong arrived at a compensation agreement with CWHKTI for the surrender of the international licence based upon an economic model which forecast alternative futures with and without the surrender of the licence. In a broadband world the uncertainties are overwhelming, owing to the ubiquity of the changes, especially those associated with the Internet, and the speed of the changes. Technologies and business models, markets, costs and revenues are all changing together, changing very rapidly and changing in ways that defy meaningful prediction.¹

OFTA is clearly aware of these developments, and aware they will be of enormous importance to the economic and social development of Hong Kong. The Consultation Paper is more focused upon the issue of 'broadband interconnection', nevertheless **I would urge OFTA to adopt two focal points. (1) regulation should be geared towards *facilitation of broadband development rather than the control of it, and (2) facilitation is best achieved by *reducing areas of uncertainty among network operators, as well as among business users and consumers, as to policy towards broadband.**** In practice this means **(a) opening the markets**, for example through class licences, to allow non-telco entities to invest

¹ For more detailed treatment of the implications of uncertainty, see John Ure, 2000. "The Era of International Simple Resale: not waving, but drowning?" *Telecommunications Policy*, vol.24, no.1 (January).

in broadband equipment - for example, building owners, hospitals, colleges, industrial estates, media enterprises - with adequate safeguards for tenants and other users in these areas to access their service providers of choice; **(b) it also means, perhaps the most difficult thing of all, to ensure co-ordination across all Government bureaus and departments** - for example, housing, education, lands and works, transport, etc. - in the implementation of policy. These points were also expressed by delegates at the Telecoms InfoTechnology Forum in December 1999, and at the Hong Kong Telecommunications Users' Group *Users' Forum* in January 2000.

2. Interconnection and the Business Model

2.1 The purpose of interconnection is to provide customers unrestricted access to the service provider of their choice, and to provide those service providers the potential of marketing services to those customers, thereby promoting consumer choice and effective competition between service providers. If these conditions are met the growth of the broadband market is more assured, and with it the economic and social benefits to the community.

2.2 In the short term unrestricted interconnection achieves this goal, but also risks disincentivising new entrants from investing in local loop access networks of their own. This raises the question, is it desirable to have multiple networks? If a ubiquitous single high capacity network existed to serve Hong Kong a case could be made out not to duplicate. If duplication (redundancy) is desirable, a case could be made out not to have multiple networks. This is a real issue, despite the appearance of potentially multiple networks - FTNS networks, cable TV, 3-G mobile, LMDS, digital terrestrial and satellite TV and Internet, etc. **If the wholesale price of CWHKTC's network and Hong Kong Cable TV's network fell dramatically, there may be little commercial incentive for other service providers to build out their own. In my opinion it would be a mistake if OFTA stood in the way of such a development.**

2.3 OFTA's stand on such issues usually revolves around whether or not competition would be materially affected. In a narrowband world, the demand for network access is derived from the demand for network usage, that is to say, the network itself holds value because it is the network which provides the means by which traditional services, such as voice and facsimile, are transmitted. In a broadband world, the demand for access is derived principally from the demand for the services, content and applications of Internet providers. In other words, the access network adds little value to the process. (There may remain intelligent functions in the access network which gives rise to demand for that particular network.) In an 'always-on' broadband world, services such as voice and facsimile, are likely to become 'free' as part of a bundled service, or completely free if a totally new business model comes about, for example, advertising-driven or e-commerce driven. **The issue of effective competition therefore becomes less to do with the number of access networks and more to do with the availability of competitively priced Internet-based services, content and applications.**

2.3 In an Internet-driven broadband world the primary point of interconnection is the Internet itself. As services and markets mature, more and more traffic will transit directly from one local access network to another. This is likely to be the case, for example, when e-commerce involving many local transactions becomes widespread, and at some point it will become in the commercial interests of the networks concerned to arrange for direct interconnection. The same happened to mobile networks in Hong Kong without the need for regulatory intervention. **It seems sensible for OFTA to have the power to determine an interconnection, but to keep it in reserve for a case where the commercial incentive is asymmetric between two networks such that one frustrates the other.** Even in such a case, interconnection through the Internet remains an alternative.

2.4 Narrowband economics and broadband economics are often the reverse of one another. A traditional narrowband approach to the introduction of a new service, like (Discrete MultiTone - DMT) G-Lite 'always-on', is to premium price it, offer it to top-end customers and wait for the competition to kick in before lowering its price and marketing it more widely. To do anything else would, for example, bring forth the wrath of managers of the private leased circuit business worried about the cannibalization of their market. But in a world which sees traditional revenues from IDD and cellular mobile services disappearing, and where there are tremendous uncertainties as to where future revenues will come from - and when, and who will be best placed to tap into them along the newly-emerging value-chains - it makes little commercial sense to adopt the traditional approach to a broadband service. It is in the self-interest of telco's, especially those with extensive local access networks which are easily upgraded to broadband speeds, to commoditize broadband access as soon as possible. It is also in their self-interest to encourage Internet service providers of all kinds to access business and residential customers as easily and as cheaply as possible to grow the services, the content and the applications business. There is an 'external' economy involved, meaning a win-win situation. The more unrelated companies, who may be potential competitors, entering the market the more growth is likely to be stimulated in the market. It therefore follows that self-enlightened telcos will not only reduce their retail prices, but also their wholesale prices. **OFTA should act in a way that clearly signals support and encouragement for such a move in this direction.**

2.5 In a broadband world, the end user becomes a customer of the Internet service providers, and in most respects the ISPs (public or private corporate networks) become the principal customers of the access network providers. This is a complete reversal of the narrowband telecoms world, but is in fact already the essence of the dial-up Internet world. **The issue of interconnection therefore becomes principally an issue of the right of ISPs to interconnect to any of the public access networks available. Interconnection between different access networks is of secondary importance to this primary issue.**

2.6 More and more of the broadband equipment will move out of the traditional access networks and into the premises of building owners at one end of the chain, and into the ownership of the ISPs themselves at the other end of the chain. **OFTA's policy of interconnection needs to be sufficiently flexible to ensure that 'vertical'**

interconnection enabling customers and ISPs to directly connect to each other is guaranteed where it is requested by either party. ‘Horizontal’ interconnection between networks may become more difficult to regulate if the access modules are dispersed along different points of different networks. This may be another reason why OFTA should tread warily on the subject of ‘horizontal’ network interconnectivity.

2.7 One other form of interconnection is absolutely required, and that is at the set-top box layer. Without industry agreed standards this is difficult, but **every effort should be made to require set-top box design to allow interoperability.**

2.8 In all cases, Hong Kong should follow, and require **the use of international standards wherever possible.**

3. Definition of Broadband

3.1 OFTA’s definition seems a sensible one in light of the dual pressures of digital compression and advances in technical designs, for example, of graphics programmes which greatly reduce memory requirements. Ultimately, the issue is not a technical one of speeds *per se*, but of the types of services that can be offered. **In shorthand, broadband can be considered anything above PSTN.**

4. Co-location

4.1 To my understanding, network interconnection can take place either on the customer-side of the digital subscriber local access module (DSLAM), in which case it is local loop unbundling whereby the interconnecting network ‘seizes’ the line to the customer, or on the exchange-side of the DSLAM, in which case it is co-location. Co-location, in turn can take two forms, either the interconnecting network locates its own DSLAM equipment next to the DSLAM of the interconnected network, or it leases or buys modules in the DSLAM of the other network, in which case it is ‘virtual co-location’. It is also my understanding that, at the very high frequencies used in ADSL over copper wirelines, cross-talk and quality of service degradation threatens to be a genuine problem. If this is the case then there may be a strong argument for resisting local loop unbundling in the early years. If this is the case, then there arises **the option of mandating virtual co-location in the absence of any private commercial agreements to co-locate, in exchange for FTNS networks to rollout broadband access. This trade-off may not be considered necessary is broadband access is seen to become ubiquitous.**

5. Interconnection Charges

5.1 LRAIC - this is a well-understood approach, is increasingly widely used, provides the right incentives when applied to the relevant investments. The Consultation Paper (p.27) argues that narrowband and broadband may share common costs which are not adequately captured by LRAIC, but in fact the likelihood is that so-called broadband 'upgrades' of an existing network are likely to be less costly than building a new broadband network from scratch. This may, indeed, disincentivise new network buildout, if interconnection charges are set rather low. But for reasons stated above, this should not necessarily be regarded as a problem. Indeed, if wholesale prices are low this should encourage the marketing of broadband Internet services. The more interesting issue is whether the wholesale, or interconnection charges, would be the same across competing access networks (FTNS, cable, LMDS, etc). The narrowband business model would suggest that some equalization be required in order to ensure due compensation of network buildout costs. The broadband business model probably says otherwise. For example, if access networks are able to make revenue by capturing some electronic commerce which passes over their networks, then the higher the volume of traffic, and the more 'vertical' interconnecting networks, the better. Wholesale prices then become part of the competition to *attract* interconnection. If LRAIC allows different networks the flexibility to charge low wholesale prices by only setting a maximum, or by differentiating the ceiling between networks, then the market is freer to develop. In fact, some networks, for example satellite networks, may be beyond this regime altogether. (This point therefore applies to all the cases below as well.)

5.2 FDC - this approach fails to distinguish the specific investments (upgrades) associated with broadband. Furthermore, if broadband in the access network is distinguished from the services which come increasingly from beyond the network, the relevance of common costs diminishes.

5.3 Retail minus approach - at first glance attractive, but the big drawback is that it focuses on retail prices rather than wholesale, deriving the latter from the former. This may lock a major access network provider into a wholesale regime that is insufficiently innovative. Furthermore, the incidence of some retail costs may fall outside the network and onto service providers.

5.4 LRAIC plus lost profit, or EPR - as far as the use of DTM over copper wire is concerned, the PSTN calls can still be routed over the original network even when the 'always-on' data connections are routed off somewhere else. It is difficult to justify any loss in that respect. As regards the opportunities foregone on broadband, the uncertainties alluded to in the Introduction make these very difficult to assess. It is difficult to see them in the residential markets, and in the corporate markets any 'losses' will be mostly due to the lack of competitiveness, which should not be compensated.

6. Conclusion

Broadband 'always-on' is likely to prove a quantum leap forward into the information, or Internet Age. It implies a major shift of focus by the industry, characterized by deep

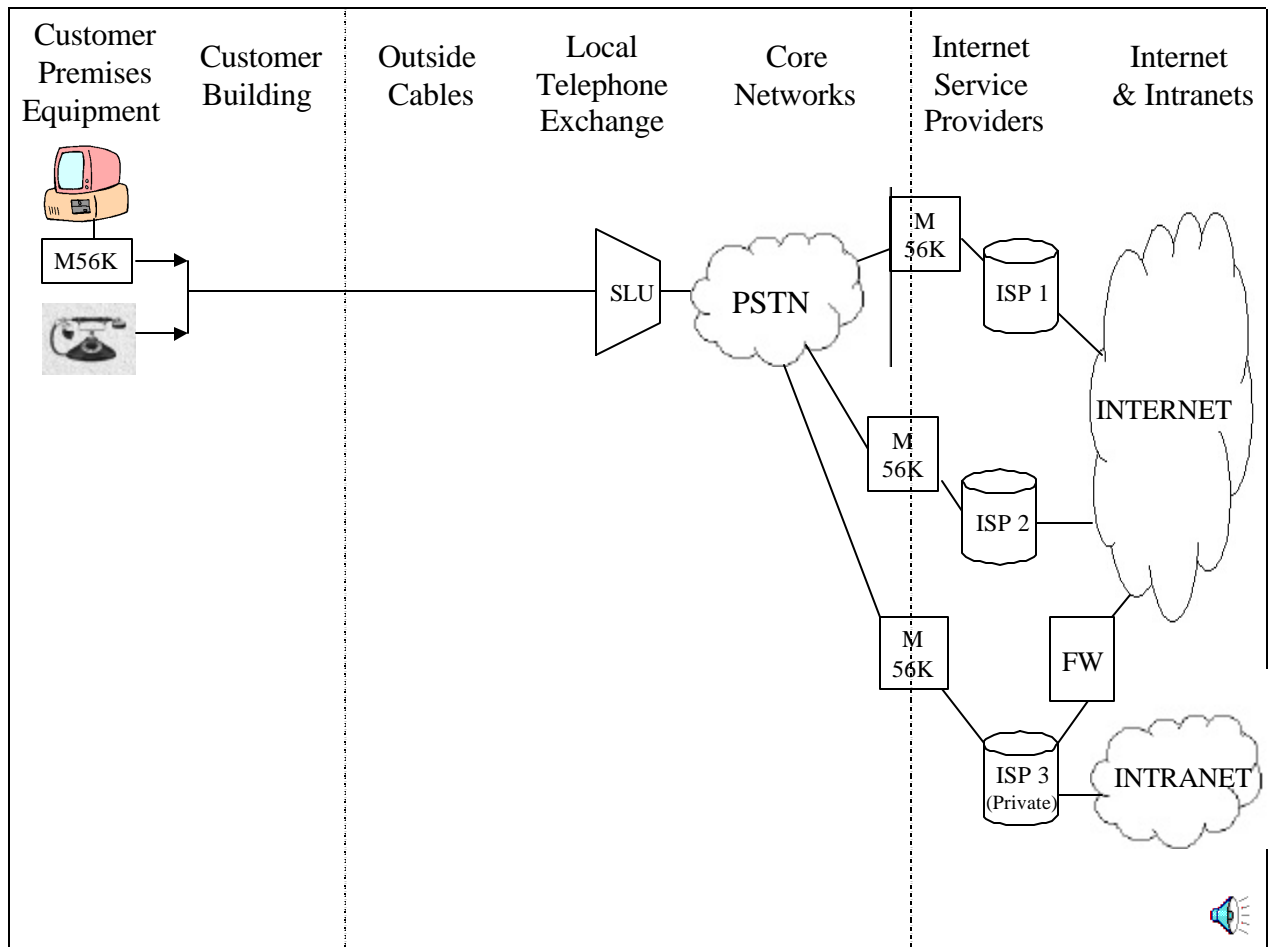
uncertainties. The role of policy and regulation is likely to have to change focus also, away from regulation as such, and more towards promotion and facilitation. OFTA is to be congratulated on its educational work in producing such a lucid Consultation Paper, and its decisions on interconnection should pave the way for this change of focus.

John Ure
28th January 2000

APPENDIX

The following diagrams add to those of the Consultation Paper in that they specify the crucial link to the Internet as the primary arena of broadband interconnection.

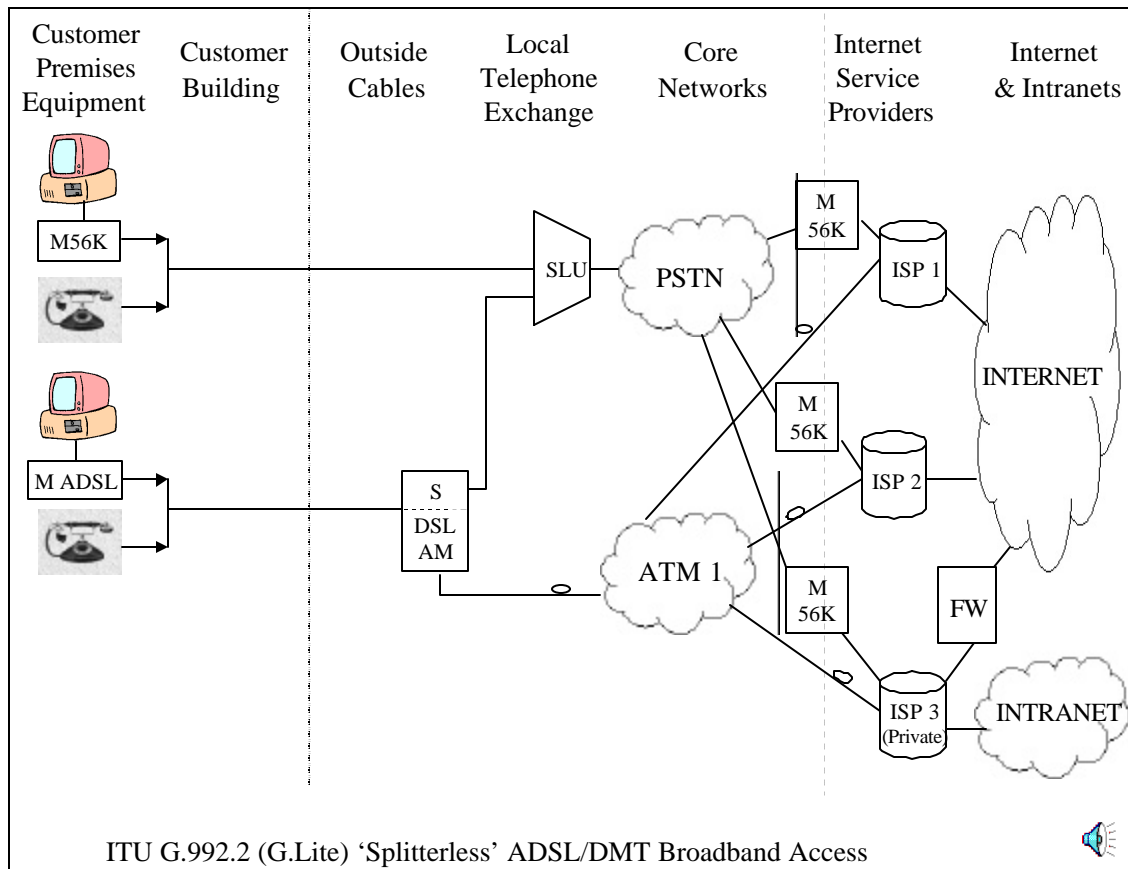
Slide 1



Slide 1 illustrates the PSTN dial-up mode of Internet access. The customer's subscriber line unit (SLU) supports telephone and Internet dial-up which are routed through the PSTN exchange, the Internet traffic then being routed through a modem bank – which may be owned and/or managed by either the telco or the ISP – to the ISP of the customer's choice, and then off into cyberspace. ISP 1 and ISP 2 represent competing public service ISPs. ISP 3 represents a private corporate network which may link to an Intranet, or through an Extranet into cyberspace using a firewall.

The essence of the customer's Internet relationship is between the customer and the ISP who provides the software, name, address, password, etc. The telco in Hong Kong receives the PNETS charge, and possibly an order from the customer for a second telephone line dedicated to the Internet traffic.

Slide 2

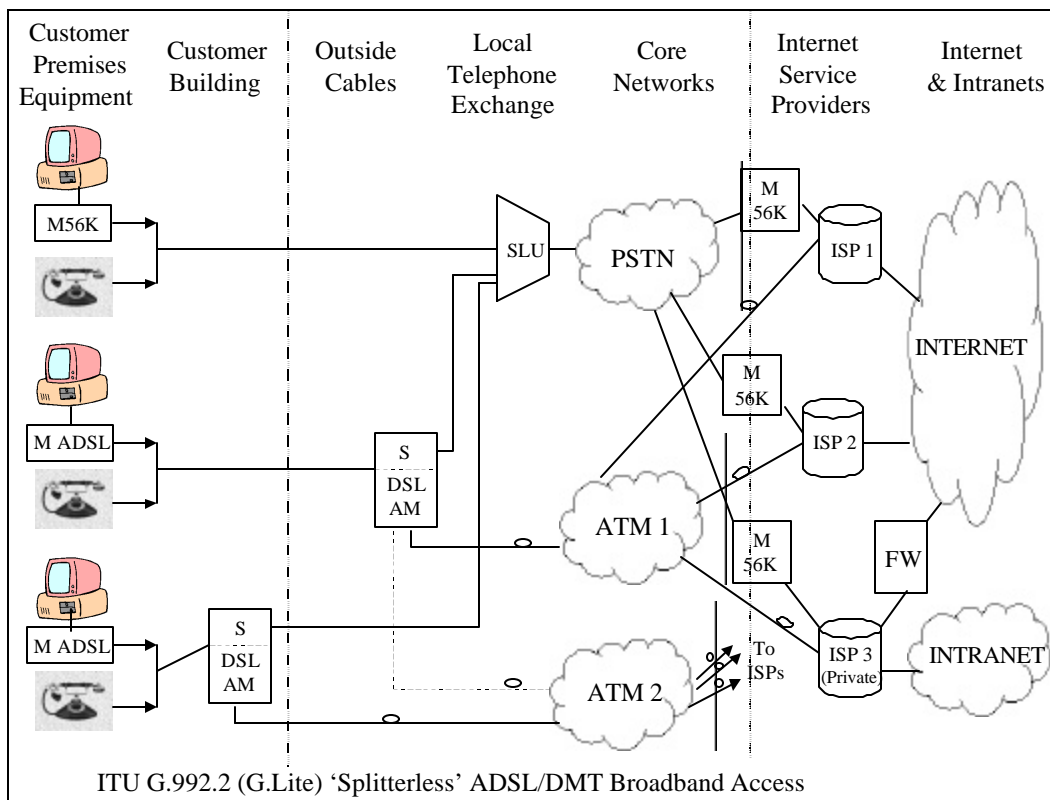


Slide 2 illustrates the introduction of a digital subscriber local access module (DSLAM) in the telephone exchange – although it could be located closer to the customer’s premises – which allows the customer to be ‘always-on’ for Internet. PSTN traffic is ‘split’ at the exchange and routed along the familiar path, but Internet traffic is routed directly to an ATM switch along optical fibre cabling and onwards through the modem banks to the ISPs and on into cyberspace. As in slide 1, the Internet is the space interconnecting all ISPs, and therefore all networks connected to the ISPs, including all local access networks.

The customer’s Internet relationship stays with the ISP. In this model there is no reason why the ISP, rather than the customer, should not order the ADSL/DMT Mbps upgrade of the copper twisted pair connecting the customer to the telco. The reason for this is that G-Lite mostly does NOT require a splitter in the customer’s premises, and so no site visit is required. The splitter resides in the exchange and the upgrade can be managed from the exchange. The same would not be true of 6-8 Mbps connections.

In this diagram, the ISPs can be considered the direct customers of the telco.

Slide 3

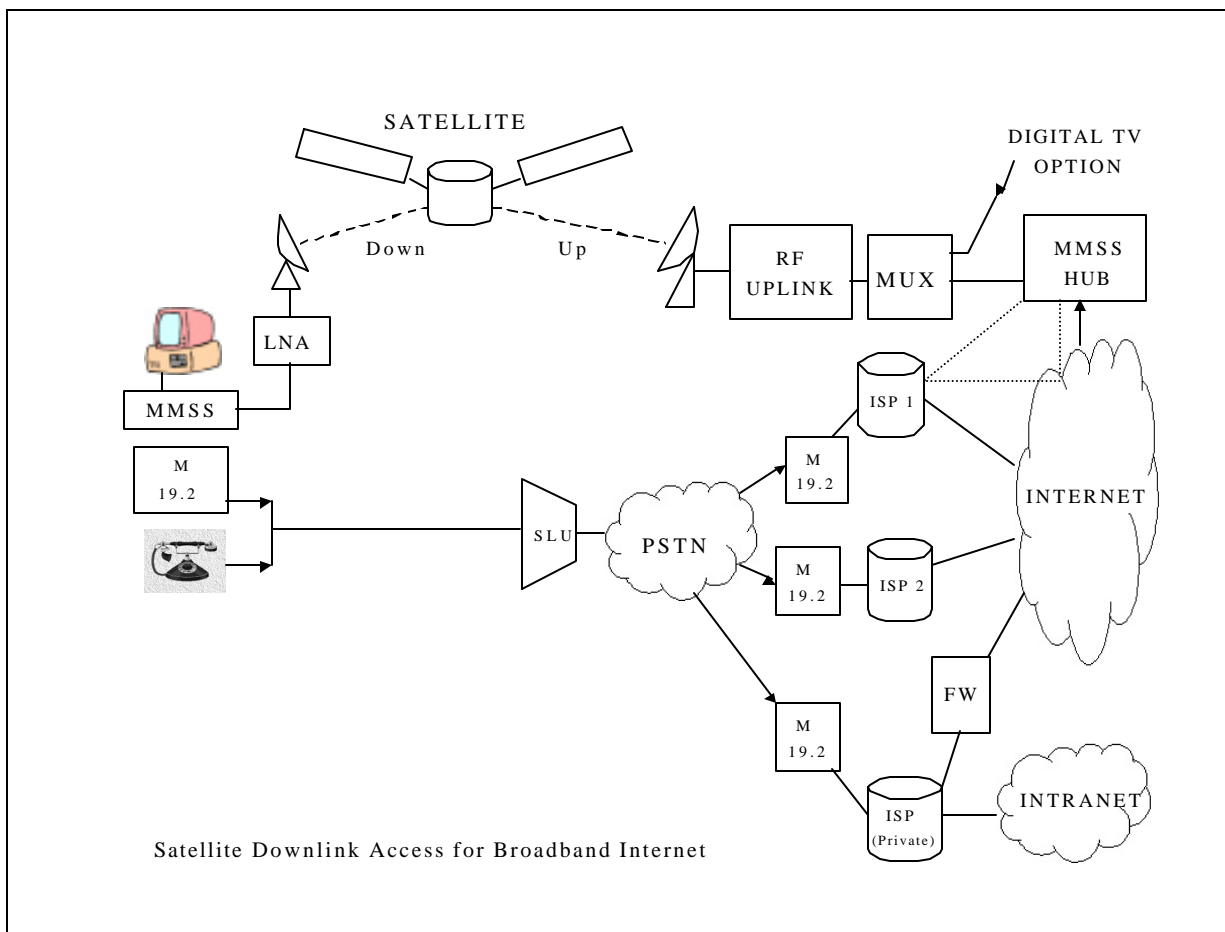


Slide 3 introduces a competing telco local access network, represented by ATM 2. The competing network can install its own DSLAM or can interconnect with the DSLAM of the first telco. Interconnection on the customer-side of the DSLAM would represent local loop unbundling. Interconnection on the exchange-side would represent co-location. Co-location could be 'real' in the sense that network 2 physically locates its access modules in the equipment room of network 1, or it could be 'virtual' in the sense that network 2 leases or buys access module units in the DSLAM of network 1.

The DSLAM could also be located in the building of the customer (illustrated here under network 2). In this case it could also be owned by the building owner. This would raise the question as to whether the building owner should then be required to interconnect with all public access networks, or is allowed to discriminate. On the face of it, discrimination should not be sanctioned.

NOTE: there is no interconnection between access networks, that is to say, at the ATM level, in this diagram. The diagram still works perfectly well because of the Internet. High volumes of traffic between networks would create a commercial incentive for network interconnection, but asymmetrical traffic streams could undermine this, so there is a case for OFTA to retain the power to mandate interconnection, but not necessarily to use that power.

Slide 4



Slide 4 illustrates another type of broadband access network, namely satellite. The relationships are essentially the same as above, but with the difference that the upstream from customer to ISP is by use of the PSTN. Later this could be a broadband upstream, for example using 3-G mobile. The important point of interconnection is at the MMSS hub. ISPs and other content providers require guaranteed interconnect in order to serve their customers. The same principles would apply to cable TV.