Development of Guidelines on Sharing Communications Infrastructure in Botswana

By
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Overview of Existing Infrastructure:

- Every operator has some form of infrastructure.
- Operators with large nationwide infrastructure:
  - All the three PTO (BTC, Mascom, Orange)
  - DBS
  - BPC
  - WUC
  - BPS

International Practice on Sharing

- Tanzania – 2005 Regulations on infrastructure sharing.
  - Sharing thru commercial negotiations.
  - Mandatory sharing of Essential Facilities owned by dominant operators.
- Ireland – Industry Code of Practice on infrastructure sharing framework.
  - Code supplement licence conditions.

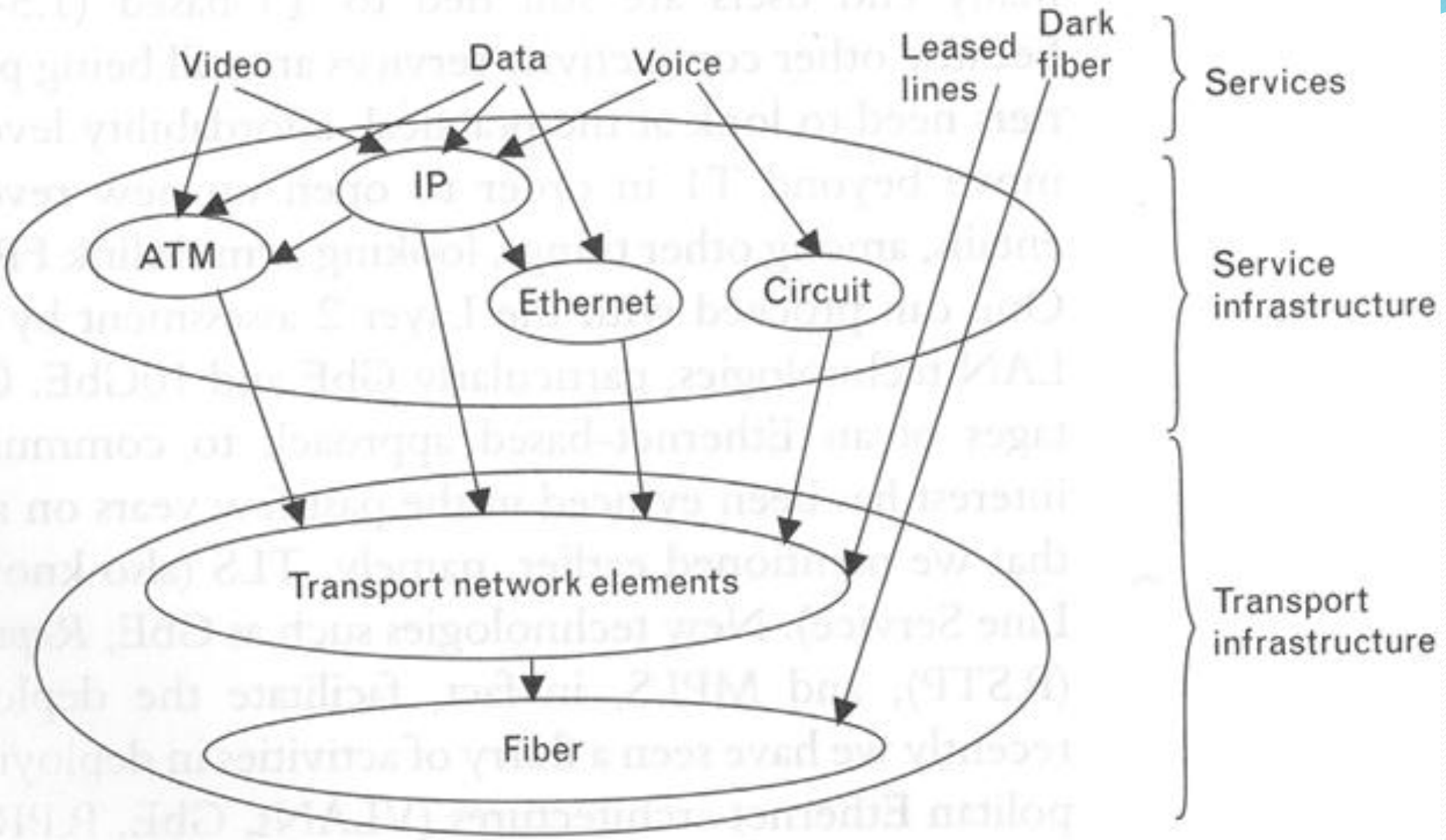
- New Zealand – 2008 Determination on Infrastructure sharing.
  - Standard Terms – only price to be negotiated.
- From interviews – sharing should be mandatory for all operators.
- ***Recommendation 4:*** *The obligation to share infrastructure (towers/sites) be applicable to all licensed operators subject to the draft guidelines.*
- ***Recommendation 5:*** *But leave commercial terms to be negotiated by the operators with the right to seek third party arbitration and or appeal to the regulator in case of a dispute. (Q&A)*

Open Access Networks

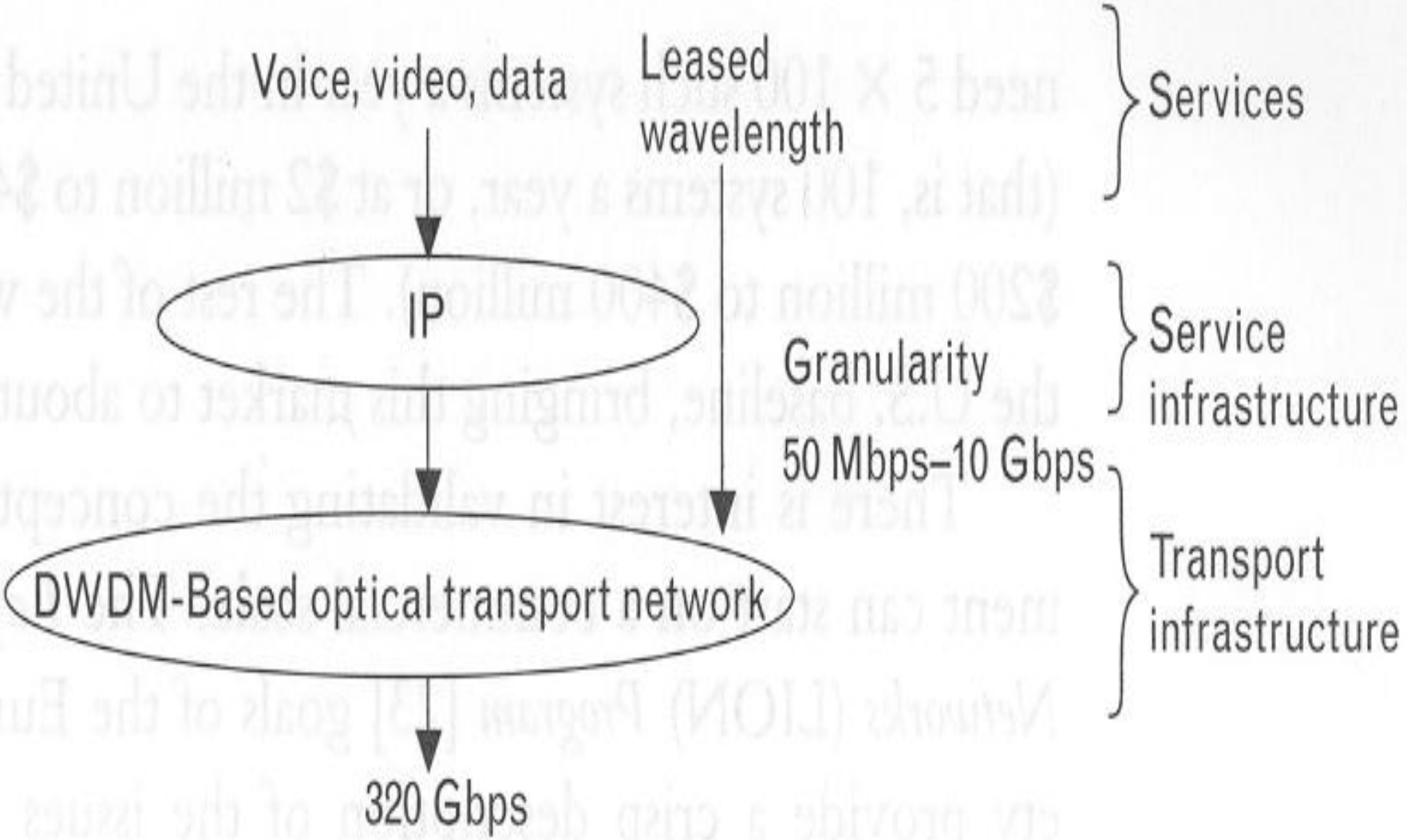
- Countries recognise that broadband infrastructure pre-requite e-business.
- The high capex required for national broadband networks => generally not feasible for private sector to rollout national braodbank networks.
- Some form of Govt intervention required.
- Govt Policy Objectives => provide the infrastructure to all service providers:
  - At minimum cost of access;
  - On fair and non-discriminatory terms.
  - => Basis for models for Open Access Network.

Layered Communications Network

- **International Organisation for Standardisation (ISO)**
  - Developed the Open Systems Interconnection (OSI).
  - OSI model – Defines rules that should be met at interface => equipment from different vendors can inter-operate.
  - Communications market can also be divided into layers:
    - Layer 1 – Transport Infrastructure (Passive)
    - Layer 2 – Services (Access) Infrastructure
    - Layer 3 – Services.



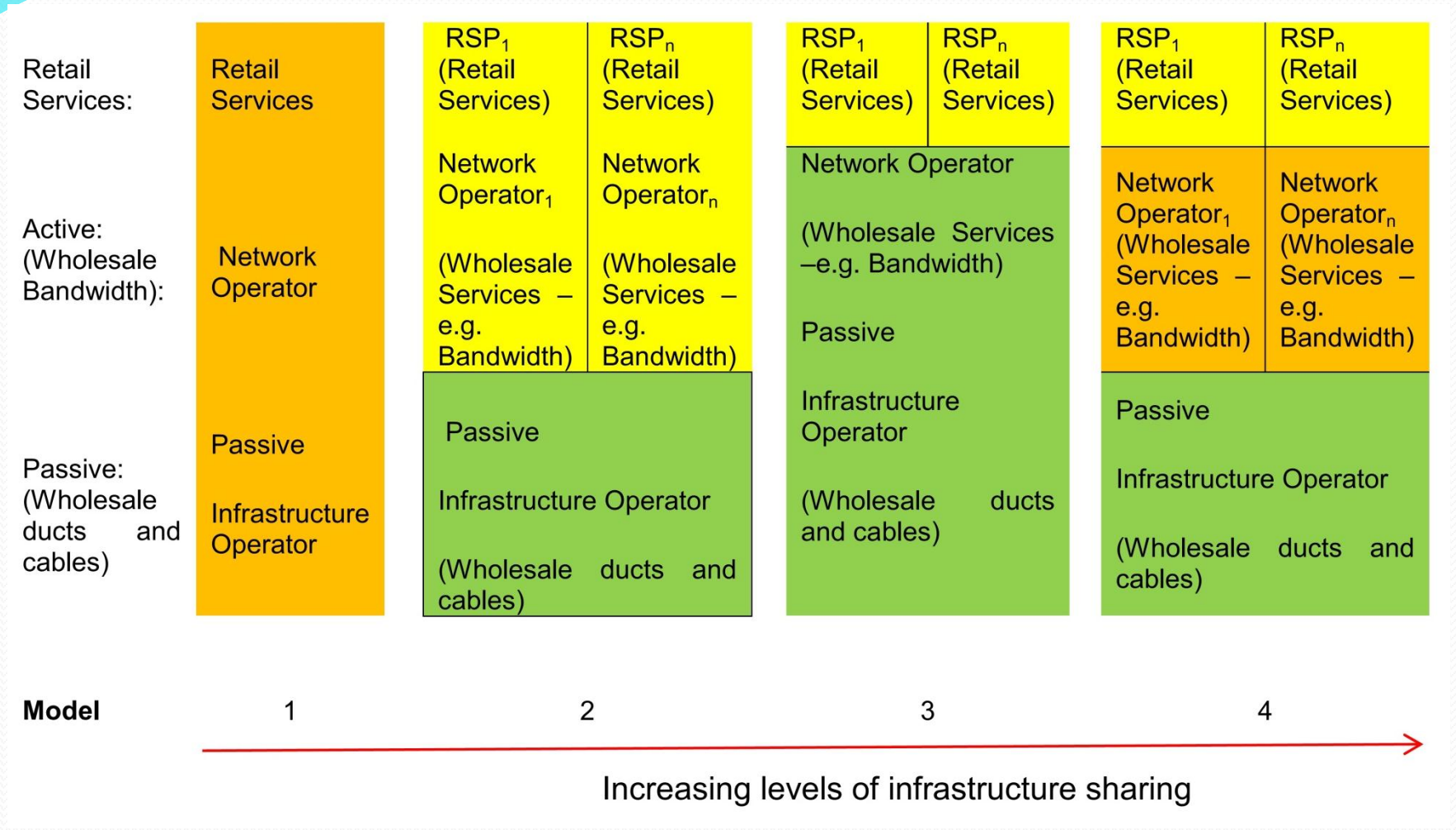
Mixed TDM and IP Service Infrastructure



Future all IP Service Infrastructure

Definition of Open Access Network (OAN)

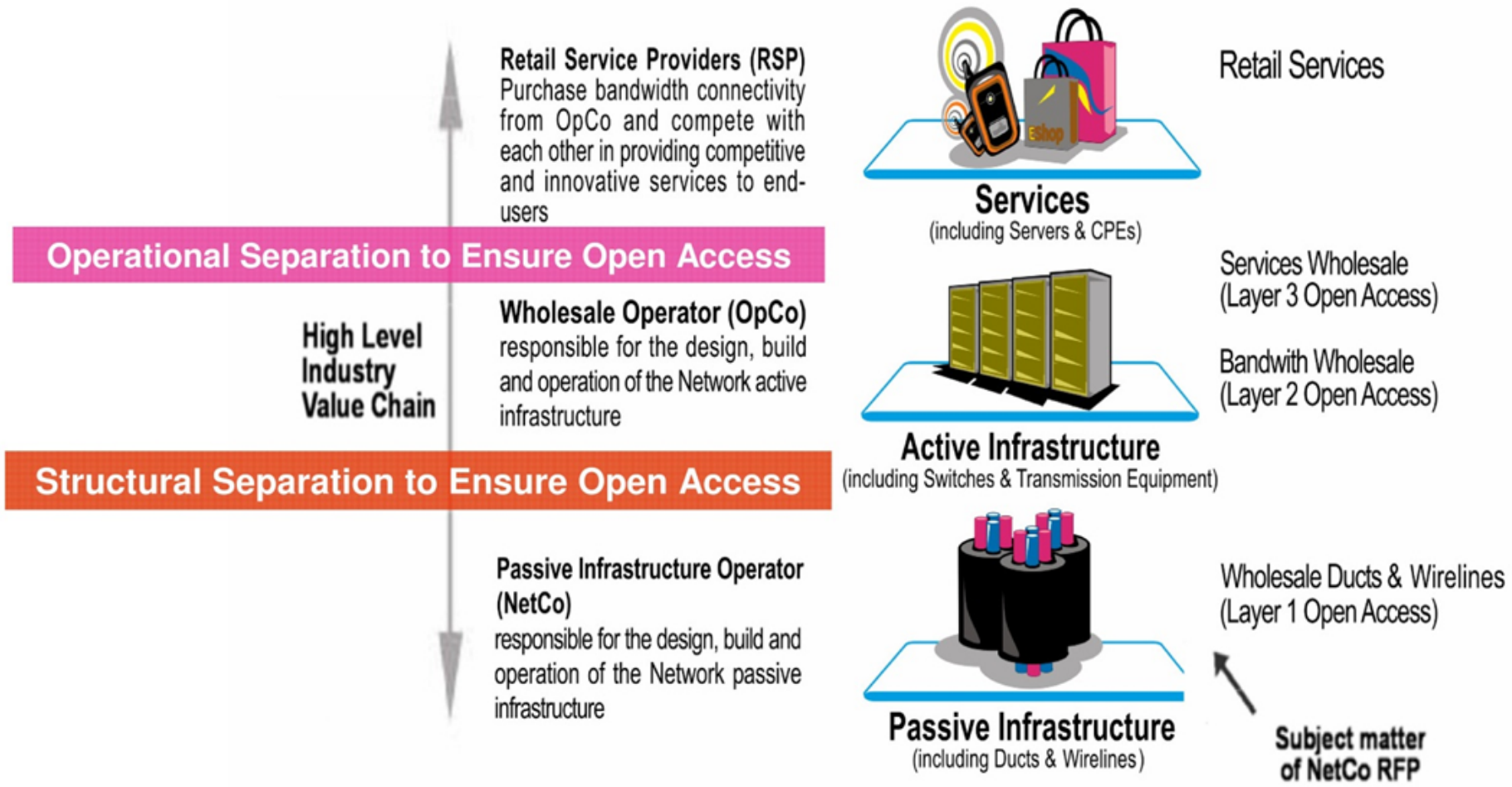
1. Consumers can choose any SP on the OAN;
2. Authorised SP free to deliver services on the OAN.
3. SP can add access points to the AON.
4. SP offered transport layer services per requirements.
5. Fair and non-discriminatory terms.
6. OAN operator to provide wholesale services to SP only => No retail services.



Open Access Models

OAN in Singapore

- 2006 – Govt announced plans to develop NGNBN.
- NGNBN – On Effective Open Access Network principles.



NGNBN Structure

- NetCo – Won by OpenNet Consortium led by Sing Tel.
- OpCo – Won by Nucleus Connect led by StarHub.
- Code of Practice for NetCo – issued by IDA:
  - Structural separation between NetCo and operators and SP
  - Obliged to offer services to authorised operators.
  - Obliged to provide information (eg. development plans) to operators.
  - Obliged to offer colocation services.
  - Tariffs subject to IDA approval.
  - Minimum period between tariff changes = 3 years.

- Operational separation between OpCo and SPs
- OpCo Interconnection Code of Practice – by IDA:
  - Structure and general content of Interconnection Agreement.
  - Obligations on OpCo and SPs
  - Specifies IDA's role (approval of Interconnection Agreements, approval of tariffs, dispute resolution, etc.).

OAN in Australia

- April 2008 – Govt issues RFP for NBN.
- Nov 2008 – Tender closes and 6 bids submitted.
- Govt Panel of experts:
  - None of bidders would meet Govt policy objectives.
  - Recommended Govt establish a company to construct and operate NBN on OA Principles.
- Govt versus Telstra:
  - Govt concerned about lack of broadband services and competition.
  - Govt wanted Telstra to voluntarily separate (structural).
  - Telstra – Would not accept structural or operational separation.

Establishment of NBN Co.

- April 2009 – Govt established NBN Co to:
  - Construct and operate NBN on OA Principles.
  - NBN Co to operate both passive and active infrastructure.
  - NBN to offer wholesale services only to SPs.
  - Structural separation between NBN and SPs.
  - Concerns that disagreement between Govt and Telstra => duplication of infrastructure.
  - June 2010 – Govt and Telstra reach agreement regarding sale of Telstra's passive infrastructure to NBN Co for AU$9 bn.

OAN in New Zealand

- Govt established Crown Fibre Holdings in Oct 2009.
- CFH responsible for rolling out UFB.
- CFH to provide wholesale services on OA principles
- Country divided into 33 regions.
- CFH to fund dark fibre only but partnering LFC to provide Layer 1 (dark fibre) and Layer 2 services (wholesale bandwidth services).
- Some relaxation of regulatory framework to encourage private sector participation.
- At year 10, investment converted to shareholding.
- NZT => Voluntary structural separation by Jul 2011.

- ***Recommendation 6:*** *It is recommended that BTA and the Government should consider the development of a national broadband strategy in consultation with all stakeholders.*

Infrastructure Sharing in Botswana

- Currently there is sharing of infrastructure.
  - Given impetus by DEA – applicants to show efforts
- Challenges in respect of infrastructure development:
- Telecoms Operators' concerns:
  - Land Board fees:
    - Application fee = P10.00;
    - Sketch plan (site visit) = P150.00;
    - Lease agreement = P60.00;
    - Annual fee = P0.25/m^2.
  - Proposed fees in one district:
    - Plan perusal fee = P5000.00
    - Monthly fee for a tower = P3000.00.

- Operators' views regarding proposed charges:
  - MTC, BTA and Operators not consulted about proposed charges.
  - Charges excessive and prohibitive.
  - Govt encouraged operators to participate in Nteletsa.
    - If charges are sustained => may reconsider their participation in current and future rural projects.
- ***Recommendation 7:*** *MLGLH, MTC, BTA and the concerned district councils should review the impact of the new rates on the development of telecommunications infrastructure in the country.*
- **Recommendation 8:** *In the event the rates are retained, then, MTC should consult the PTO on the implications of these rates on the rollout of telecommunications services in the country.*

- **Recommendation 9:** *Consideration should be given to coming up with either uniform rates that land boards and or councils should charge and or alternatively guidelines with respect to levying such fees after consultation with all stakeholders including the MTC, the BTA, telecommunications operators, District Councils and respective land boards.*

Site acquisitions in urban areas

- Allocations by the respective councils.
- Urban Development Standards 1992 – MLGLH
  - Provision for BTC cables along road reserves.
  - No mobile networks => fewer towers.
- Mobile networks – increased demand for mobile services => increased requirement for base stations.
  - Public concerns about environmental impact of Base Stations:
    - Perceived negative effects of radiation from base stations.
    - Negative visual (aesthetic) impact of multiple towers.

Perceived effects of radiation from base stations

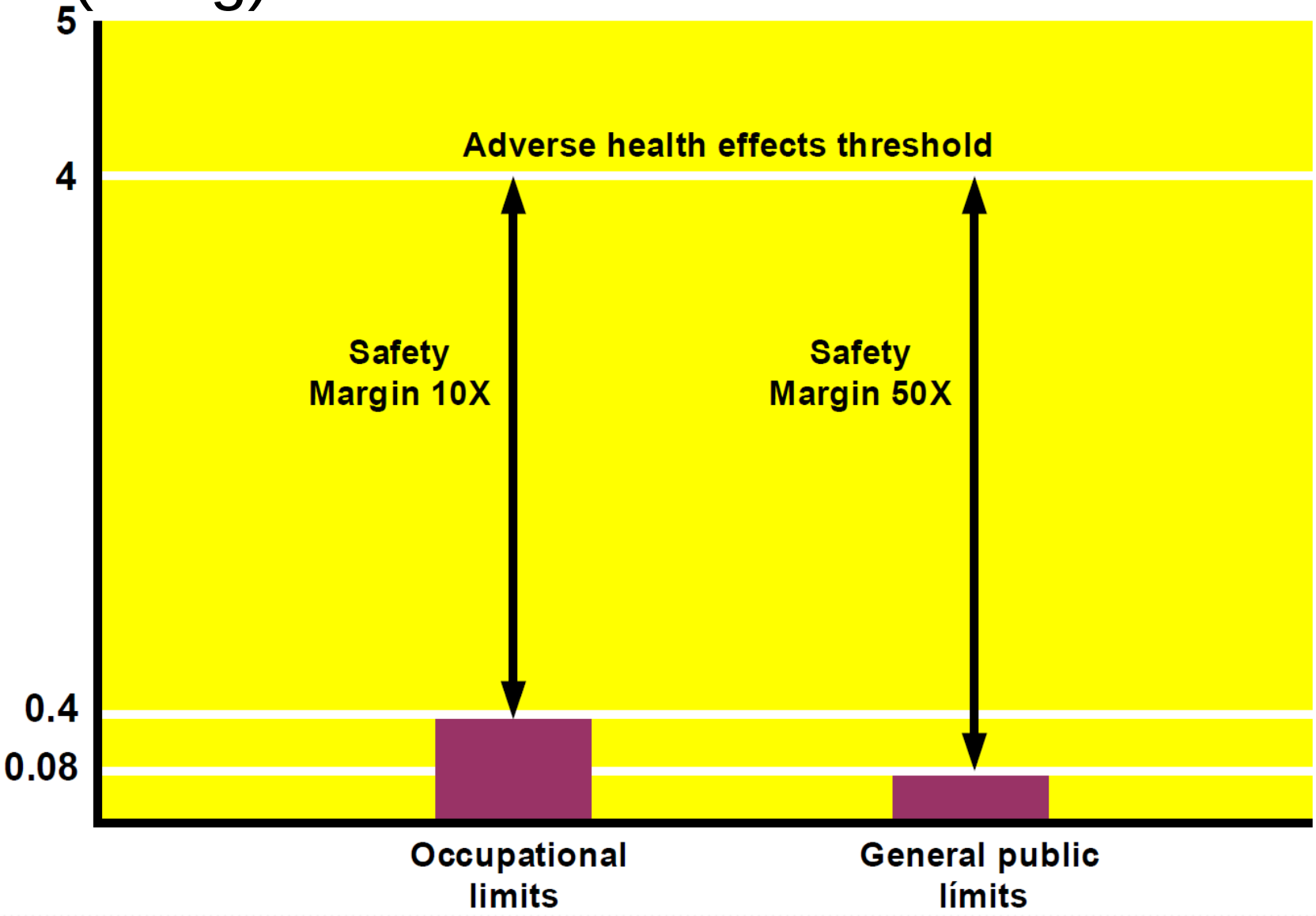
- 9 – 10 Nov 2010 => BTA held a public workshop on EM Radiation. Presentations (on BTA Website) from:
  - International Commission on Non-Ionizing Radiation Protection (ICNIRP).
  - European Committee for Electrotechnical Standardisation (CENELEC).
  - GSMA
  - EMSS Consulting
  - International Agency for Research on Cancer
  - Mobile Manufacturers Forum
  - Karlsruhe Institute of Technology

Extracts from November workshop (not in report):

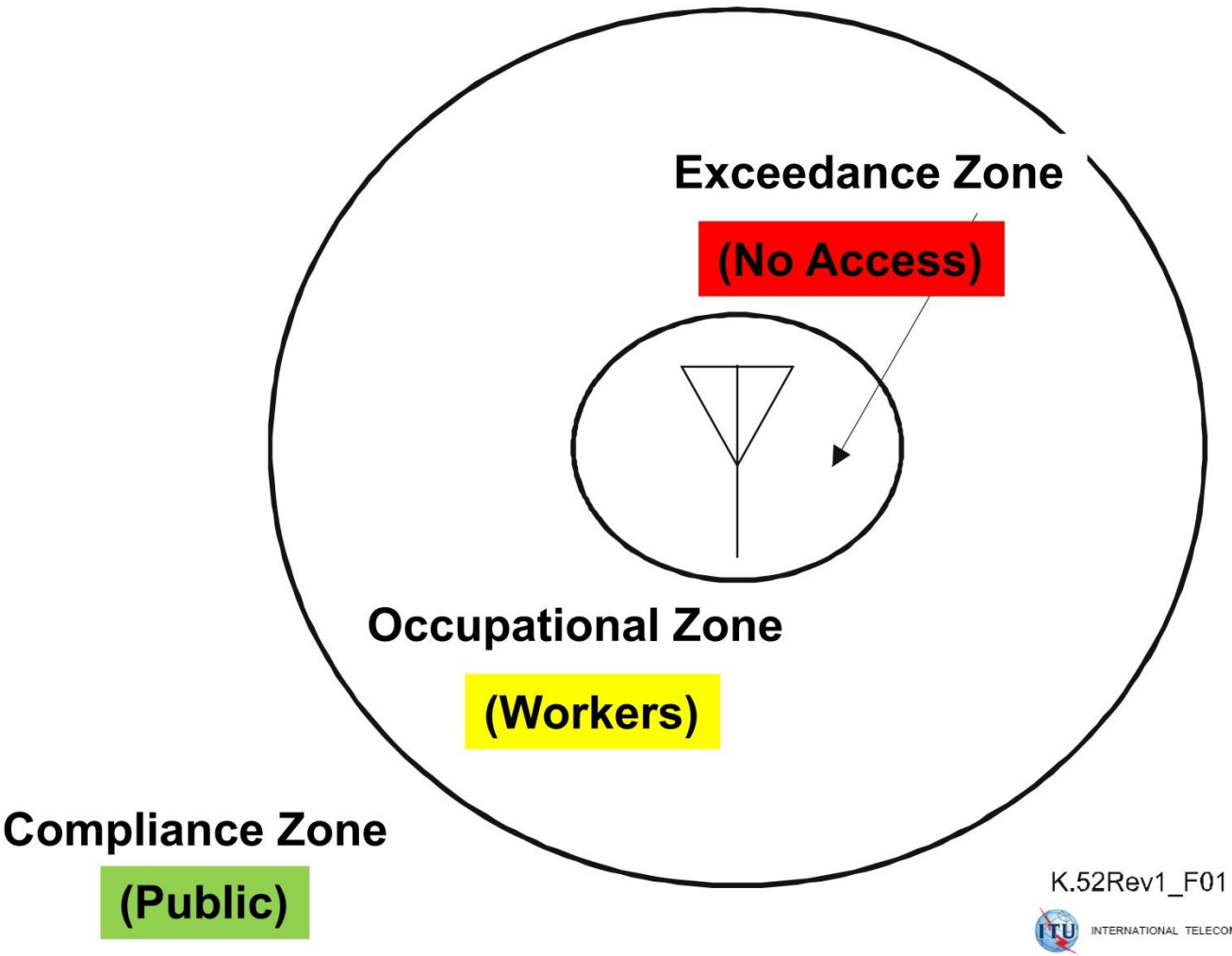
ICNIRP is an independent scientific organization that:

- Provides **guidance and advice** on the health hazards of non-ionizing radiation (NIR)
- Develops **international guidelines** on limiting exposure to NIR that are independent and science-based
- Provides **science-based** guidance and recommendations on protection from NIR exposure.
- Produced guidelines on limiting exposure to EMF.
  - Endorsed by WHO, ITU, CENELEC and GSMA.
  - Adopted by Council of the European Union.
  - Adopted by many countries (Ghana, India, Rwanda, Hong Kong, UK, Germany, Canada, France, Australia, Malaysia, Sweden, Brazil, Chile, etc.).

SAR (W/kg) thresholds vs ICNIRP Limits

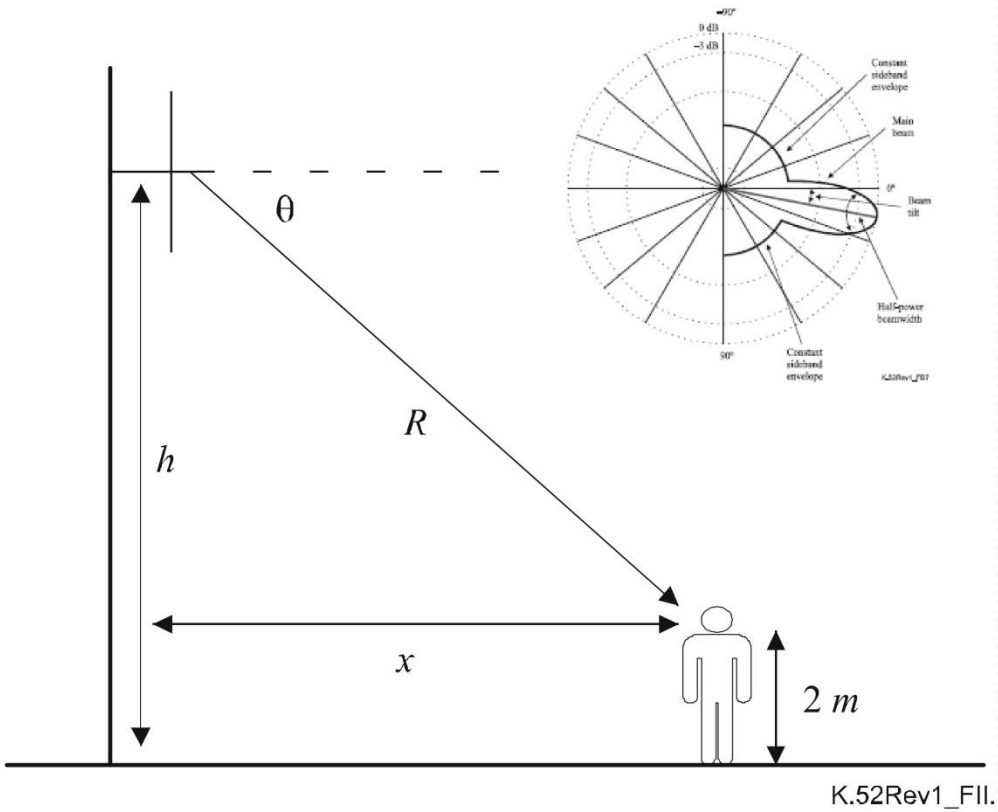


Antenna Exposure Zones



Compliance: Calculations

- Assessment without measurement.
- Requires information about antenna, transmitter and so on.
- Based on conservative assumptions.
- Basis for compliance declarations.
- Multiple sources?



RF Exposure Assessment: Calculation

$$S = \frac{P\,G}{4\pi d^2}\,N \quad (W/m^2)$$

$$d = \sqrt{\frac{P\,G}{4\,\pi\,S}}\,N \quad (m)$$

P = Power to antenna (W)

G = Linear isotropic gain

d = Distance from antenna (m)

N = Near field correction factor (reduced antenna gain).

- Eg calculation of compliance zone for public:
  - 900 MHz BTS, Power to antenna = 63W, G = 15.5 dBi, F/B = 30 dB (panel antenna), then
  - Distance limit for public exposure = 6.3m (in front and at same height as the antenna). Limit for public exposure behind antenna = 0.2m.
  - Such a situation only likely in cases of antennas on top of buildings and antenna pointing towards accessible areas.
    - Avoid installations where antennas are at heights less than 3m on roof tops and pointing to accessible areas or adjacent buildings that are less than 6m away.
    - If unavoidable, => Implement controlled access and train all personnel with access to the area.
- November 2010 workshop => recommended that Botswana should adopt the ICNIRP Guidelines.

Negative visual impact of towers

- Multiple towers near each other a concern for the public and DEA from visual perspective.
- Majority of interviewed stakeholders were of the view that sharing of towers should be mandatory.

- ***Recommendation 10:*** *All users of radio communications system should be required to adhere to the guidelines on infrastructure sharing in order to reduce the number of towers that are built in close proximity of each other.*
- ***Recommendation 11:*** *There should be no restriction on the location of towers on account of concerns about electromagnetic exposure, as long as operators can demonstrate on a case-by-case basis, to the satisfaction of the BTA, that the electromagnetic exposure that the general public will be subjected to will be below the ICNIRP limits.*

- ***Recommendation 12:*** *All operators with radio transmitters should train their staff that install and or maintain radio transmitters and landlords on whose buildings they have installed radio transmitters about the requirements of the ICNIRP Guidelines.*

Stakeholders' concerns about EIA studies

- EIA studies required by law.
- Concerns:
  - Occasionally operators required to consult many institutions (BTA, Land Board, Kgosi, Department of Radiation Protection) on EMF effects.
  - Delays in EIA approval process.
  - DEA constrained by manpower shortage, made worse by:
    - Operators submitting applications late and in most cases when projects are in progress.
    - Submitting applications without all the required documents.
    - Applications for towers in the same general area instead of sharing a tower.

- ***Recommendation 13:*** *It is recommended that operators should share infrastructure in accordance with guidelines.*
- ***Recommendation 14:*** *EIA studies should be undertaken during the feasibility (planning) phase for all projects to ensure that by the time the project gets to implementation all approvals would have been granted.*
- ***Recommendation 15:*** *DEA should consider outsourcing the review of EIA Reports to speed up the process of EIA approvals and thus reduce delays in the rollout of infrastructure and services.*

Rights of Ways for towers vs Visual Impact

- Match infrastructure to the environment, where possible.
- However, for towers,
  - Location;
  - Maximum height;
  - Colour and
  - Requirement for navigational lights are determined by CAAB.

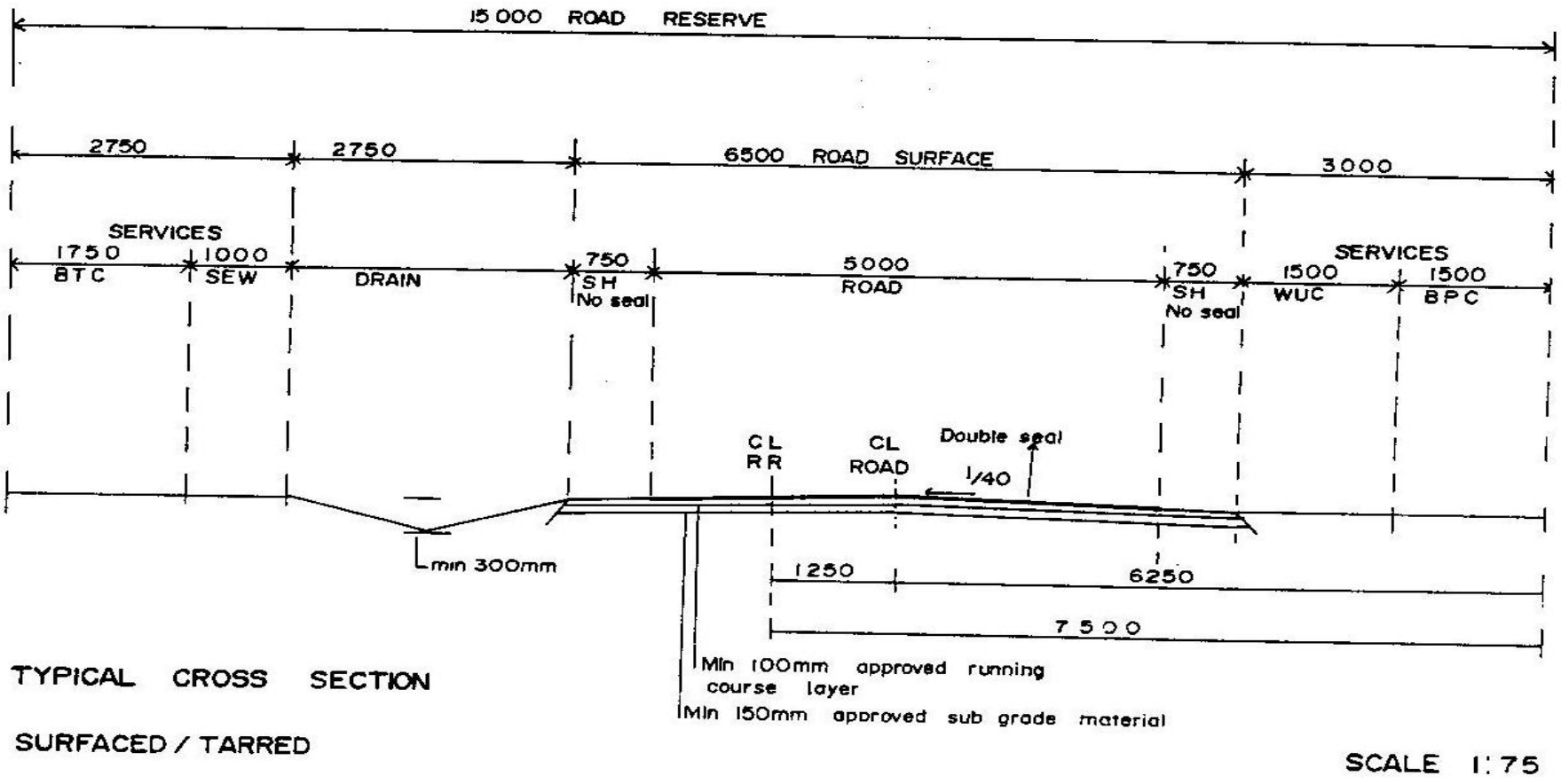
- ***Recommendation 16:*** *It is recommended that operators should paint their infrastructure to match the surrounding environment. In the case of towers, operators should seek authorisation from CAAB to paint their towers in colours that match the environment.*

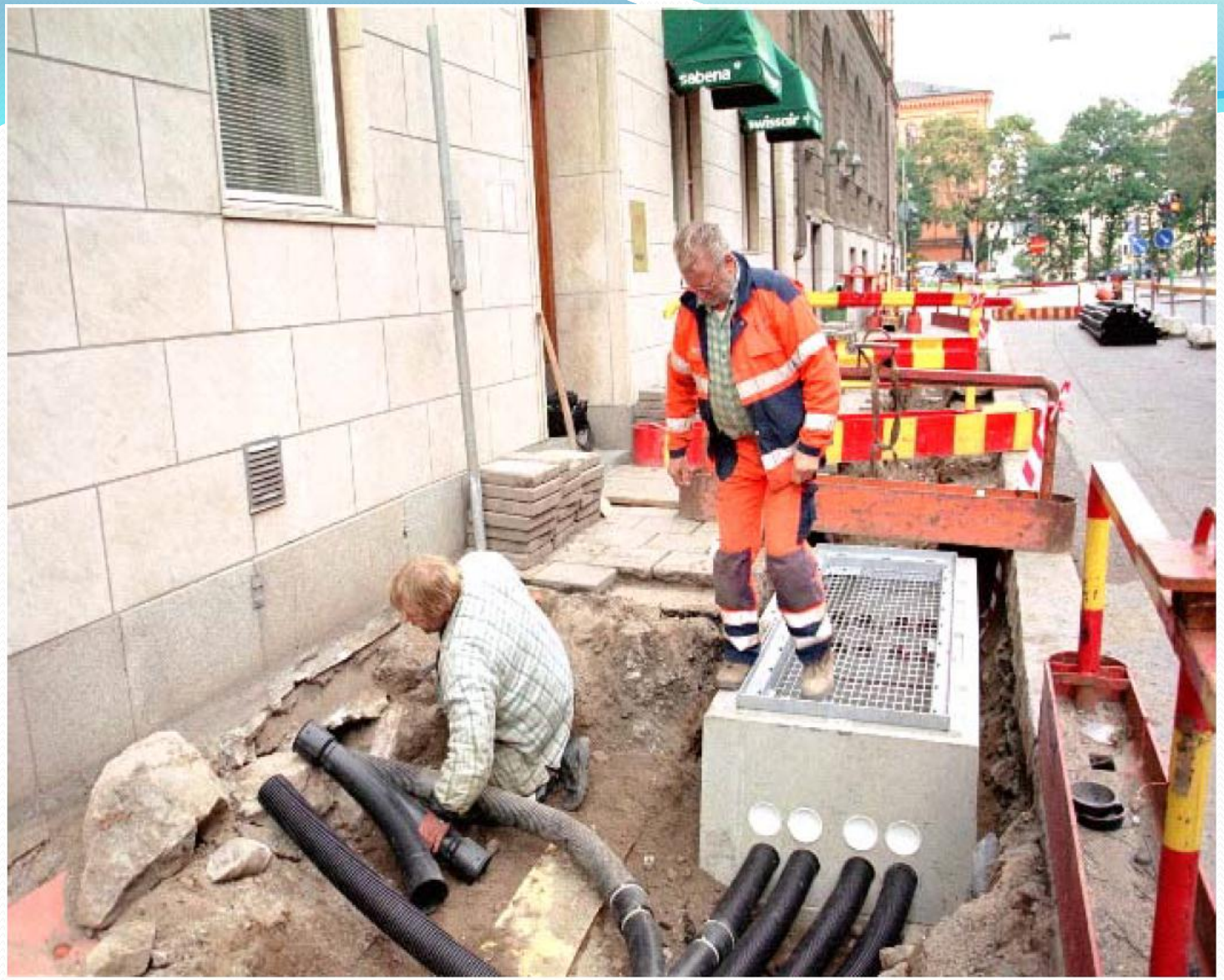
Right of Ways for fibre optic cables

- Most mobile operators rely on microwave radios links.
- Challenges with of microwave links in urban areas:
  - Prone to interference problems => difficult to detect and resolve.
  - LOS may not be possible due to buildings.
  - Increased requirements for mobile broadband services => capacity constraints in microwave links.
- Some mobile operators want to install fibre optic cables to supplement microwave links.
- Urban Development Standards, 1992 => space allocation for telecoms in road reserve.

Challenges with FO installation in towns

FIG 8: ACCESS ROAD





Typical installation F.O. Cable ducts in urban areas (Stockholm)

Challenges:

- Most of the space along the road reserves used by BTC, BPC, WUC, Council Sewage Systems.
- The public, Roads Dept, Local Authorities, DEA not amenable to roads being cut.
- All current and future PTOs have a right to use space allocated telecoms services along road reserves.
- Sharing of cable ducts should be mandatory.
- Basis for municipal OANs (Stockab, Utopia, etc.).

- **Recommendation 17:** *It is recommended that sharing of cable ducts should be mandatory between all the PTOs. The details of the manner of sharing will depend on which of the four options discussed below is adopted.*
- **Recommendation 18:** Any PTO that constructs a cable duct system should make provisions to share with other PTOs. PTOs should agree a procedure for implementing this requirement, failing which any PTO may appeal for BTA's intervention. The agreement should be lodged with BTA for information and filing.
- **Recommendation 19:** *Each PTO that has a fibre cable network should develop a standard agreement for leasing of spare fibres to other operators. The standard agreement should be submitted to BTA for filing, save that BTA shall have the power to raise any issues it considers relevant.*

- ***Recommendation 20:*** *All infrastructure development forums such as the Urban Development Committee should be restructured to include all key stakeholders in the communications industry (eg. all PTOs, representative of the Association of ISPs, etc.).*

- ***Recommendation 21:*** *Infrastructure planning should include consultations with key stakeholders in the communications sector (PTOs, the Association of ISPs, etc.) to ensure that their requirements are incorporated in land development plans.*

Options for sharing cable ducts:

Option 1 – BTC leases ducts to other PTOs:

- BTC prepares a standard leasing framework for ducts and dark fibre.
  - Terms and conditions (including tariffs) for leasing.
  - SLA
  - PTOs negotiate the framework
  - Right to refer to BTA for determination.
- Advantages – Parties can structure the agreement to their requirements.
- Disadvantages – Tends to lead to protracted negotiations and probably declaration of a dispute.

Option 2 – Govt to establish an OAN Operator

- Problems sited with respect to Option 1:
  - Incumbent operator may negotiate in bad faith:
    - Wins by delaying
    - Wins by charging unreasonable rates.
- Regulator often accused of not ensuring that the incumbent operator negotiates in good faith but not that simple:
  - Other operators also want access to infrastructure at the least cost.
- Govt could take a policy decision to establish an OAN operator that would operate and expand the backbone network, including the cable ducts.

Advantages of Option 2:

- Govt could stipulate clear policy objectives for the OAN operator.
- Structural separation => OAN operator treats all SP in a fair and equitable manner.

Disadvantages of Option 2:

- Structural separation length and complex process.
- Would require some legislative changes.
- May impact negatively on Govt's intention to privatise BTC.

Option 3 – Operational separation of BTC

- Middle ground between Options 1 and 2.
- Establish a separate entity (BTCI) within BTC Group (with separate Board) for managing backbone network (including ducts and fibres). Similar to BT's Openreach.
- Govt stipulates policy directives for the entity based on input from other stakeholders.
- The Board/BTA ensure that BTCI complies with the agreed undertakings.

Advantages of Option 3:

- Easier to implement than Option 2.
- Govt could consult other stakeholders re their requirements and ensure that BTCI facilitates their objectives.
- Would give Govt an opportunity to assess how it would handle BTCI during privatisation of BTC.

Disadvantages:

There is always a chance that BTCI may give preferential treatment to members of the BTC Group.

Option 4 – Joint development of FO infrastructure

- PTOs jointly agree to develop and maintain the FO infrastructure. Details to be worked out:
  - Compensation for existing infrastructure by other parties.
  - How future infrastructure expansions would be handled.
  - How ownership of infrastructure would be formally recognised.
  - How maintenance would be shared.
- **Advantages –** No need for structural separation of BTC.
- **Disadvantages –** Detailed agreement re ownership of jointly developed infrastructure.

Recommendation 22: *Stakeholders are requested to comment on the four options and to advise of their preference, with reasons. Stakeholders may also offer other options that should be considered as regards sharing cable ducts.*

BPC as telecommunications operator

- BPC owns about 850km of FO cable which covers most of the major urban areas for its comms system.
- BPC would like to use the excess capacity to provide telecommunications services.
- Precedents of power companies providing telecoms services:
  - South Korea
  - Japan

Recommendation 23: *It is recommended that BPC's request for approval to use its extensive fibre optic cable network to provide telecommunications services be approved. BTA would determine the type and conditions of the licence that would be granted to BPC.*

Infrastructure Licences

- Some countries (India, Nigeria, Pakistan, etc.) grant infrastructure licences to enable licensees to build infrastructure for shared use.
  - Very useful, especially for shared use of towers.

Recommendation 24: *We recommend that as part of the implementation of infrastructure sharing BTA should consider taking steps to grant appropriate licences to utilities and other infrastructure owners so as to enable them to offer infrastructure sharing as a service.*

Request for written comments:

- Guidelines – Apply to all comms operators
- Enforcement – By BTA to support other Govt institutions (DEA, Local Authorities, etc.).
- Submit written comments by 9th March 2011.
  - Principles – For or against
  - Details – For or against
  - For and against – State options and support positions.
- Publish comments on BTA's website.
- Stakeholders – Can comment on others' input.
- Review feedback from stakeholders.
- Prepare final report/draft regulations.

Thank you!