



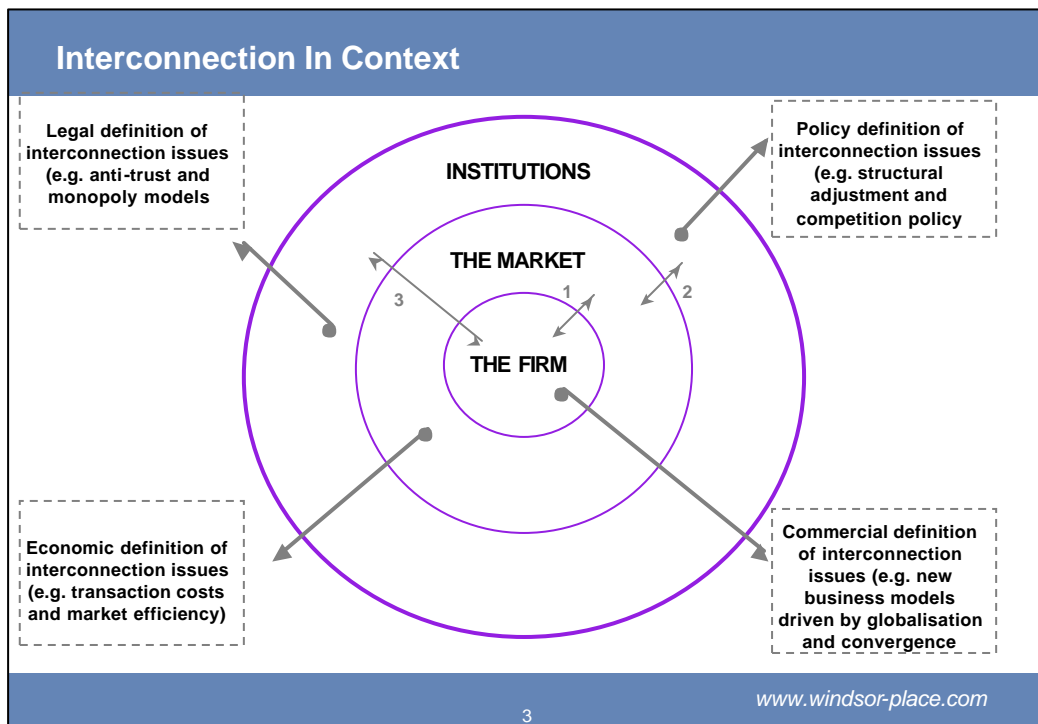
Introduction to Interconnection

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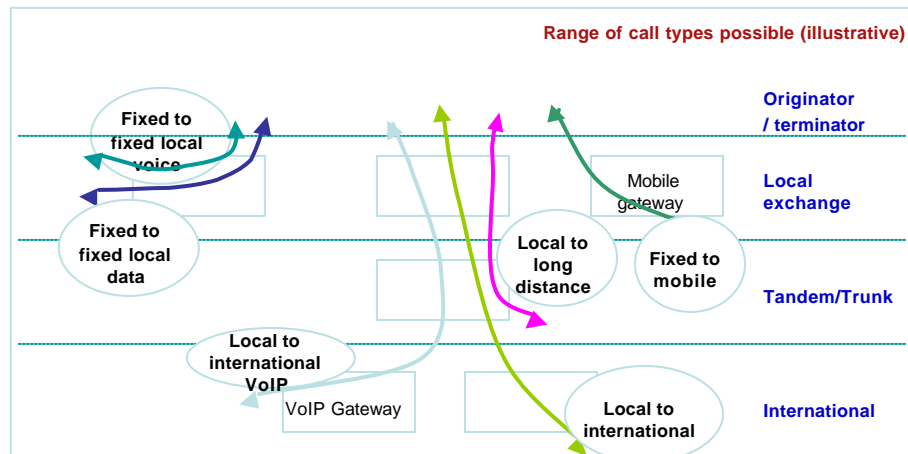


A. Fundamentals of Interconnection



- ## What is Interconnection?
- International Telecommunications Union (ITU) defines interconnection as “the set of legal rules, technical and operational arrangements between network operators that enable customers connected to one network to communicate with customers of other network”
 - The World Bank defines interconnection as “the physical and logical linking of public electronic communications networks used by the same or a different undertaking in order to allow the users of one undertaking to communicate with the users of the same or another undertaking or to access services provided by the parties involved or other parties who have access to the network”
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Range of Different Call Types - which are dealt with in an ICA



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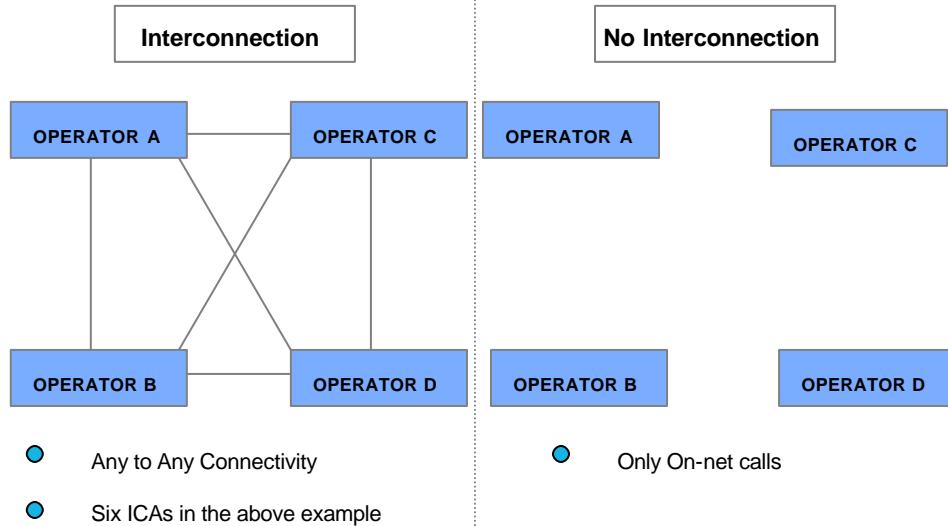
Why is Interconnection Needed?

- Interconnection is central to the development of an effective telecommunications industry
 - The old monopoly model for delivering telecommunications services is dead or dying
- Interconnection is needed because:
 - No single operator can own or lease all the network required to switch calls to and from all possible locations
 - No operator has ever owned or leased all the network components for international calls
 - The requirement for any to any connectivity is paramount in the market
 - Legislation and policy has facilitated network competition

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Interconnection versus No Interconnection



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Interconnection Services

- Interconnection Services encompass:
 - Basic interconnection services
 - Use of network elements
 - Ancillary services
 - Enabling services
 - Rental of physical components/Infrastructure sharing

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Interconnection Services - Basic Interconnection Services

- Call Origination
 - Examples include: Local services, Mobile services, National services, International services, Freephone services and Internet access services
- Call Termination
 - Examples include: Local services, Mobile services, National services, International services and Premium rate services
- Transit Services
 - Examples include: Calls from Operator A to Operator C through the network of Operator B.

Interconnection Services - Use of Network Elements

- Interconnect Capacity - transmission capacity between two networks
- Other examples of network elements include:
 - Local loops
 - Transmission facilities
 - Network access devices
 - Operational support systems eg. billing, ordering and fault repair
 - Switches - local, mobile and trunk
 - Signalling systems
 - Call related databases

Interconnection Services - Ancillary Services

- Examples of ancillary services include:
 - Operator assisted services
 - Directory assistance services
 - Emergency call services
 - Reverse charge call services
 - Freephone/ Toll Free services
 - SMS/MMS/GPRS/Roaming

Interconnection Services - Enabling Services

- Examples of enabling services include:
 - Equal access (call-by-call)
 - Equal access via preselection
 - Number portability

Interconnection Services - Rental of Physical Components

- Examples of physical components include:
 - Ducts and poles, towers
 - Building space eg. for co-location
 - Interconnect capacity or links
- Also known as “infrastructure sharing”

Basic Elements of Interconnection Architecture

- Call Handover
- Point of Interconnection
- Call Charging Areas
- Equal Access (call-by-call)
- Equal Access via Preselection
- Number Portability

Call Handover

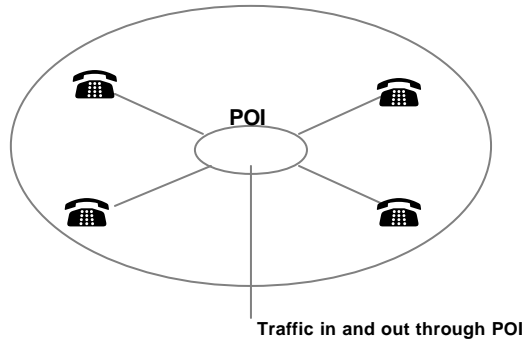
- Far End Handover
 - Call communication is delivered as close as possible to the called-party's (termination) destination/network
- Near End Handover
 - Call communication is delivered as close as possible to the calling party (originating) destination/ network
 - Often, the originating party does not know the destination of the call and delivers to the terminating network at the closest point
 - Typically used for interconnection to mobile networks and calls to special services

Point of Interconnection

- The switching points at which two networks interface and come together
- POI may be virtual or physical
- POI may take place at:
 - Local exchanges or switches
 - Trunk exchanges or switches [*Normally only at these levels initially when*
 - International Exchanges or gateways [*competition commences*
- Networks can be connected - via full span or in-span circuits

Call Charging Areas

- This is a geographic area in which the originating and terminating charges occur [can be small or large depending on the market]



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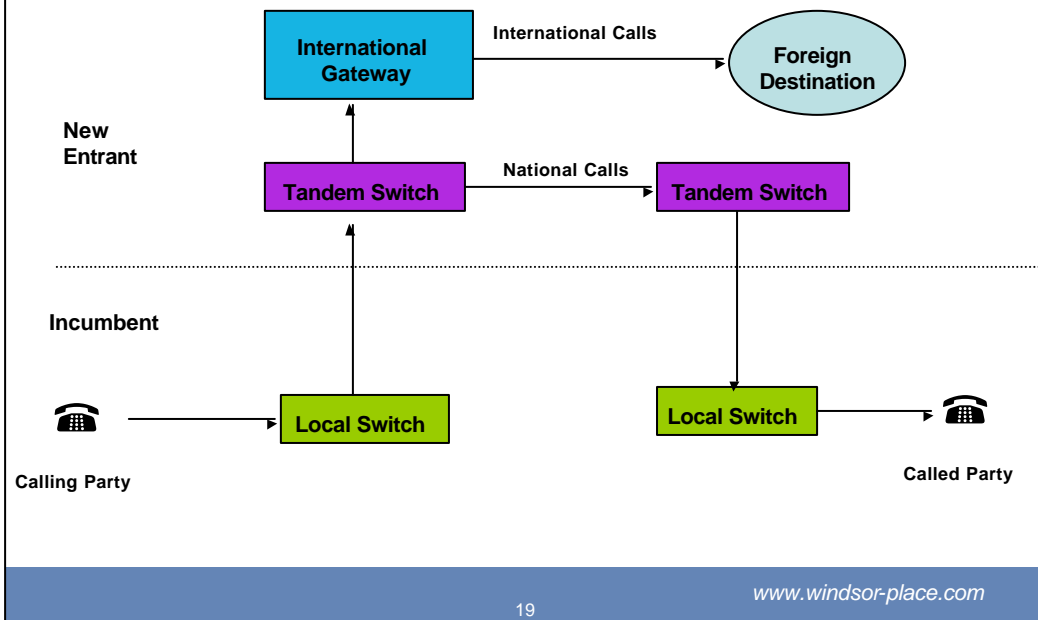
Equal Access (Call-by-Call) and Preselection

- Equal Access (Call-by-call)
 - The customer selects certain types of call communications of another carrier on a call by call basis by dialling a carrier selection code (CSC)
 - The interconnected networks are completely transparent and seamless
- Equal Access via Preselection
 - The customer preselects another carriers for all call communications falling within the basket of preselected services.
 - The relevant call communications will be routed to the networks of the preselected carrier without the customer having to dial a carrier selection code.
 - Done via category marking at the exchange level

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Equal Access



Number Portability

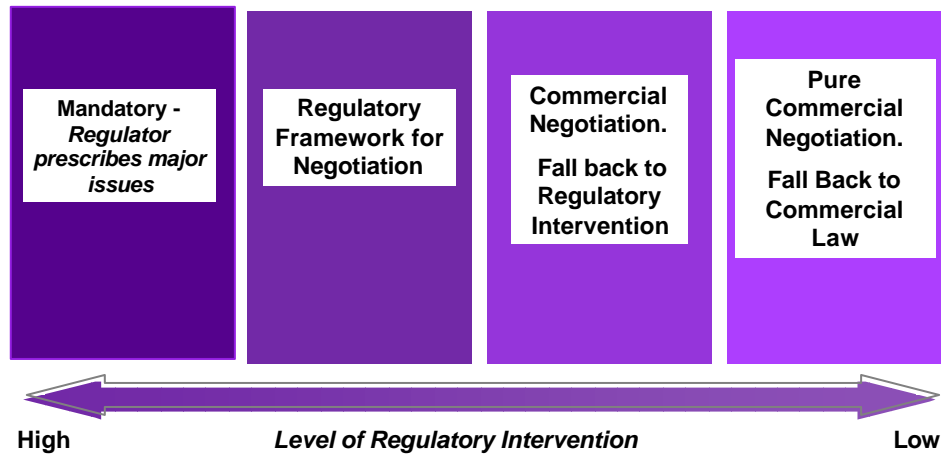
- Customers are allowed to keep their telephone number when they change network operators or service providers.
- There are three key services, each of which can be implemented independently of the other:
 - Number portability between fixed operators which allows customers to keep their telephone number when they change basic telephone service provider. In addition, customers who move location at the same time can use the service if they stay within the same local exchange or local dialling area
 - Number portability between cellular mobile operators
 - Number portability between providers of freephone service

B. Interconnection Regulation

Why Interconnection Regulation is Necessary

- Fundamental to the success of competition policy
- Significant differences in market power between incumbents and new entrants
- Complex technical, legal and economic issues involved
- Experience has shown that interconnection is the stumbling block to effective competition/new entrant entry

Generic Types of Interconnection Regulation



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Interconnection Regulatory Frameworks

- The regulation of interconnection is being driven at the international level across multiple countries:
 - WTO
 - APEC
 - European Commission
- The interconnection models put forward by the WTO, APEC and the EU provide a common basis for identifying "high level" interconnection principles:
 - Provides regulatory guidelines in advance
 - Dominant carrier (or significant market power - SMP) focus
 - Transparency
 - Non-Discrimination
 - Cost Orientation

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Interconnection Principles

- The development of a robust and workable interconnection framework is critical for the long-term success of a country's telecommunications sector.
- As a minimum, an interconnection framework should encompass the following interconnection principles:
 - General principles including the duty to interconnect with other licensed operators and the principles of non-discrimination;
 - Principles relating to interconnection charging (wholesale prices which licensed operators will pay for call termination and other carrier-to-carrier services and facilities);
 - The regulator's proposed approach and deadlines with respect to interconnection negotiations;
 - Technical issues related to interconnection including those related to the important point of interconnection; and
 - Promotion of customer/consumer interests and provision/protection of information.

Interconnection Issues - Regulatory

- What policy outcomes does the policy maker wish to achieve?
- What would a "satisfactory" interconnection framework look like?
- What degree of regulatory intervention is desired?
- What type of regulatory interventions are to be used?
- What commitment of resources from the regulator would be made?
- What is the scope of regulatory interest in interconnection?
- Are there specific charging principles which apply?

Interconnection Issues - Commercial

- What is the scope of interconnection services demanded and provided?
- What are the prices at which interconnection services are provided?
- What is the process for resolving disputes between parties?
- What are the general terms and conditions for interconnection?
- What are the appropriate quality of service standards?
- When does billing take place?
- What billing information is exchanged?

Interconnection Issues - Technical

- What is the appropriate location and number of POIs?
- What is the network level at which interconnection takes place?
- What are the applicable inter-operability standards?
- When is new interconnect capacity required?
- What are appropriate arrangements for co-location?

C. Interconnection Agreements

Structure of Interconnection Agreements

- Recitals
- Definitions and Interpretation
- Scope of Agreement
- Points of Interconnection and Interconnection Services
- Traffic Measurement, Routing and Access Services
- Network and Facility Changes
- Infrastructure Sharing and Co-location
- Billing and Settlement
- Universal Service Obligations

Structure of Interconnection Agreements

- Quality of Service/Performance and Trouble Reports
- Provision of Information
- Ancillary Services
- Dispute Resolution
- Network Protection
- Intellectual Property Rights
- Confidentiality
- Liability and Indemnity
- Review

Structure of Interconnection Agreements

- Termination
- Liability and Indemnity
- Boilerplate Clauses
- Charges and Charging Principles
- Technical Manuals

Key Provisions - Definitions and Interpretation

- Terminology varies significantly among different countries and operators
- It is important to ensure compatibility of terminology to local environment when adapting interconnection agreements from other countries
- Definitions in other documents may be referenced e.g. definitions in laws of regulation, regulatory guidelines, ITU definitions

Key Provisions - Scope of Agreement

- Different types of interconnection agreements have different purposes (e.g. two local networks, local to long distance/international, fixed-to-fixed, fixed-to-mobile, mobile-to-mobile, local ISP to ISP backbone)
- The purpose of some interconnection agreements is to provide termination services or transit services, others involve provision of unbundled facilities and services, etc

Key Provisions - Point of Interconnection and Interconnection Services

- POI locations (e.g. exchanges, meet points) are usually listed in the schedules or appendix, which may be modified from time to time.
- Specific POI facility locations (e.g. digital distribution frame , manhole splice box)
- Description of network facilities to be interconnected (e.g. OC-3 fibre optic terminals with interconnecting single-mode optical fibres)
- Specify capacity and/or traffic volume requirements
- Indicate which party is to provide facilities and services
- Technical specifications (e.g. calling line identification specs, basic and ISDN call control interface specs)
- Specify type of signalling networks/standards (.e.g CCS7)
- Signalling or POI locations to be specified

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Key Provisions - Traffic Measurement and Routing

- Traffic measurement and routing responsibilities and procedures
 - Describe party responsible, measurement and reporting procedures
 - Rules for routing of different types of traffic, if any

Key Provisions - Network and Facility Changes

- Planning and Forecasts
 - Requirement for mutual notification of network changes and capacity forecasts
- Periodic network planning reports may be specified
- Facilities Ordering Procedures
 - Specify rights and obligations of each party with respect to ordering and provisioning of interconnection facilities and services
 - Confidentiality requirements and procedures
 - Ensure no anti-competitive use of order information
 - Specify order format and procedures
 - Co-ordination process for migration of customers between operators
 - Order confirmation and other rejection procedures, timely notification, notification of additional charges, etc

Key Provisions - Infrastructure Sharing and Co-location ...1

- Sharing of Infrastructure, Procedures and Costs
 - Availability of poles, conduits, towers, rights of way, etc
 - Procedures, if any, for determining available capacity, allocating capacity among requesting operators
 - Provision and pricing of supplementary services (e.g. electrical power, security systems, maintenance and repairs, etc)
 - Sub-licences on property of third parties (e.g. right of way of owners, municipal and other public and private property owners), insurance and indemnification for damages

Key Provisions - Infrastructure Sharing and Co-location ...2

- Co-location
 - Availability of actual or virtual co-location, list of addresses where co-location is available, procedures for determining available space reservation of expansion space
 - Provision and pricing of supplementary services (e.g. electrical power and emergency backup power, lighting, heating and air-conditioning, security and alarm systems, maintenance and repairs, etc)
 - Procedures for ensuring access to and security of co-located facilities
 - Negotiation of other lease or licence arrangements including issues of sub-licences on property and third parties, insurance and indemnification for damages

Key Provisions - Billing and Settlement

- Billing Arrangements and Responsibilities
- Billing Procedures
 - Interconnection billing media
 - Guidelines for production of interconnection billing outputs
 - Customer service record provision
 - Retention periods for billing data
- Payment terms and conditions
 - Invoices and related charges
 - Payment terms and conditions including late payment penalties and interests charges, etc
- Billing disputes and reconciliation procedures

Key Provisions - Provision of Information and Confidentiality

- Data interchange format
- Data to be exchanged
 - Specify all data types and systems for which data is to be interchanged
 - Customer listings in directories and databases
- Access to and use of customer information
 - Confidentiality procedures for customer information
- Access to and use of operator information
 - Confidentiality procedures
 - Intellectual property rights

Key Provisions - Dispute Resolution

- Procedures for resolution of disputes under agreement that are not specifically dealt with elsewhere for example:
 - Good faith negotiations, time schedule for the same, escalation through management levels
 - Referral to regulator, arbitrator or court
 - Selection of, and procedures for arbitration

Key Provisions - Technical Manuals

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- Operations and maintenance manual
 - Network information
 - Commission and de-commissioning and re-arrangement practices
 - Maintenance practices
 - Fault handling procedures
 - Complaint handling
 - Network monitoring
 - Access to POI sites
 - Contact lists
 - Quality of service standards

Key Provisions - Technical Manuals

...2

- Technical and implementation manual
 - Principles for network configuration
 - Forecasting, ordering and provisioning procedures
 - Notification of international roaming data
 - Routing and numbering principles
 - Routing of ancillary services
 - Signalling and technical specifications for interconnection
 - Billing procedures
 - Transfer of charge band data
 - Call processing
 - POI establishment, relocation and removal procedures

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D. Interconnection Regulation In Indonesia

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Interconnection Framework in Indonesia

- The Government Regulation of the Republic of Indonesia Number 52 Year 2000 on Telecommunication Operation (“Telecommunications Regulation”) expressly provides for interconnection in Indonesia.
- In addition, the Indonesian interconnection regime is outlined in the draft Decree of Minister of Communications on Interconnection between Telecommunication Operators (“Interconnection Decree”) which comprise of *inter alia*:
 - the Ceiling Interconnection Charges determined for the period from 1 January to 31 December 2005 (Annex 1 of the Interconnection Decree);
 - the Telecommunications Regulatory Accounting Standard - Cost Allocation and Reporting Manual (Annex 2 of the Interconnection Decree);
 - the Guidelines on Reference Interconnection Offer (Annex 3 of the Interconnection Decree);
 - the Guidelines on Essential Facilities for Interconnection (Annex 3 of the Interconnection Decree); and
 - the Dispute Resolution Framework (Annex 4 of the Interconnection Decree).

Telecommunications Regulation

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- Part Four of Chapter 2 of the Telecommunications Regulation expressly regulates interconnection of the network operation of telecommunication. In particular:
 - Article 20 requires telecommunication network operators to guarantee the availability of interconnection in interconnection points upon request by the other operator of telecommunication network.
 - Article 21 prohibits telecommunication network operators from discriminating against any customers in providing telecommunications services and to provide interconnection to each other at mutually agreed level of services.
 - Article 22 requires the telecommunication network operators to enter into written interconnection agreements and provides for dispute resolution in the event of inability to agree on the interconnection agreements.
 - Article 23 provides for payment of interconnection fees for communication services provided by network operators.

- Article 24 requires equipments of telecommunication service operators and telecommunication network operator to be carried out in a transparent and non-discriminatory basis.
- Article 25 requires a telecommunication network operator to channel traffic through other telecommunication network operators in return for payment of an interconnection fee, where it has no direct connection to the telecommunication network in the call destination either domestically or internationally (transit arrangement) or where it has insufficient capacity in respect of the direct connection.

E. Interconnection Regulation in Malaysia

Legislative and Regulatory Background

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- Chapter 3 of Part VI of the Malaysian *Communications and Multimedia Act 1998* ("CMA") seeks to establish a regime to ensure that all network facilities providers, network service providers & applications service providers can gain access to the necessary network facilities and network services on reasonable terms and conditions in order to prevent the inhibition of the provision of downstream services

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Legislative and Regulatory Background

...2

- The key components of the access regime under the CMA include:
 - access list;
 - access code;
 - access undertakings;
 - standard access obligations;
 - access agreements; and
 - access disputes.

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Key Definitions - Access Code

- "Access Code" is defined as a voluntary industry code prepared under section 153 of the CMA.
- The Access Code may include *inter alia*:
 - model terms and conditions for compliance with the standard access obligations;
 - different terms and conditions for access to different network facilities and services listed in the access list;
 - timeframe and procedures for negotiation of access agreements;
 - rate methodologies;
 - protection of intellectual property;
 - protection of commercial information;
 - provisioning of facilities; and
 - sharing of technical information.

Key Definitions - Access List

- 'Access List' is defined as the list of facilities or services established under Chapter 3 of Part VI of the CMA.
 - Pursuant to section 145 of the CMA, the list of facilities & services which may be included in the access list are network facilities, network services & other facilities and/or services which facilitate the provision of network services or applications services, including content applications services, which are determined by the Commission.
 - The Commission has made a determination on the access list which came into effect on 1 April 2001.
 - Pursuant to section 149 of the CMA, a network facilities provider and network services provider ('Access Provider') are required to provide access to their network facilities or network services listed in the access list to any other licensee who makes a written request for such access ('Access Seeker').

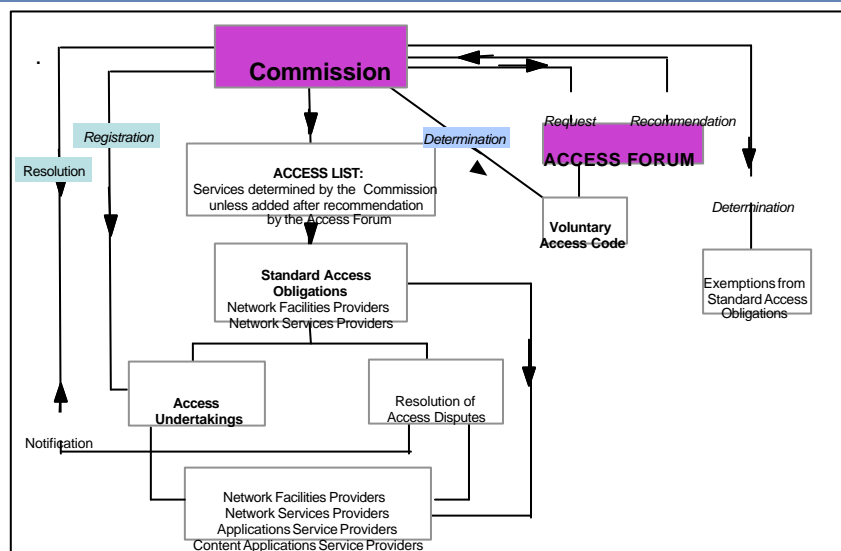
Key Definitions - Access Undertaking

- There is no definition of 'access undertaking' in the CMA.
- According to the Explanatory Memorandum to the CMA, the access undertaking is an agreement by the person to:
 - meet particular conditions;
 - perform particular actions; or
 - provide services on particular terms and conditions for the undertaking.
- Section 110 of the CMA empowers a licensee to provide an access undertaking regarding any matter which is subject to an access code.

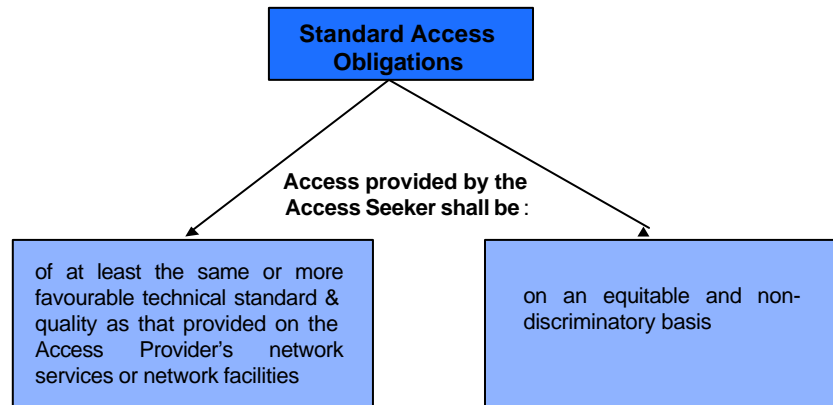
The access undertaking:-

- may set out terms and conditions for the undertaking; or
- adopt the model terms and conditions from a registered voluntary access code.

Relationship Between Access Code, Access List and Access Undertaking



Standard Access Obligations



Recent Developments

- The Malaysian Communications and Multimedia Commission issued the *Commission Determination on the Mandatory Standard on Access Determination No.2 of 2003* ("MSA Determination") which came into operation on 14 August 2003.
 - The MSA Determination determined terms and conditions to be adopted in the Access Agreements.
 - The Operators have renegotiated their existing Interconnection Agreements and entered into new Access Agreements to be compliant with the MSA Determination
 - Pursuant to the MSA Determination, the Operators have also prepared and maintain Access Reference Documents in relation to network facilities or network services on the Access List which the Operators provide to themselves or third parties.

Access Agreement

- An Access Agreement may be:
 - entered pursuant to an Access Reference Document; or
 - commercially negotiated between the Operators.
- Definition of Access Agreement
 - The MSA Determination defines an Access Agreement as "an agreement entered into between Operators whereby the Access Provider provides access to an Access Seeker in accordance with the terms contained in such agreement and which shall be registered with the Commission in accordance with the CMA".
- The Access Agreement basically sets out the terms and conditions on which network facilities and network services are offered by one operator to the other operator, subject to the scope of their respective licences.

F. Interconnection Regulation In Australia

Legislative and Regulatory Background

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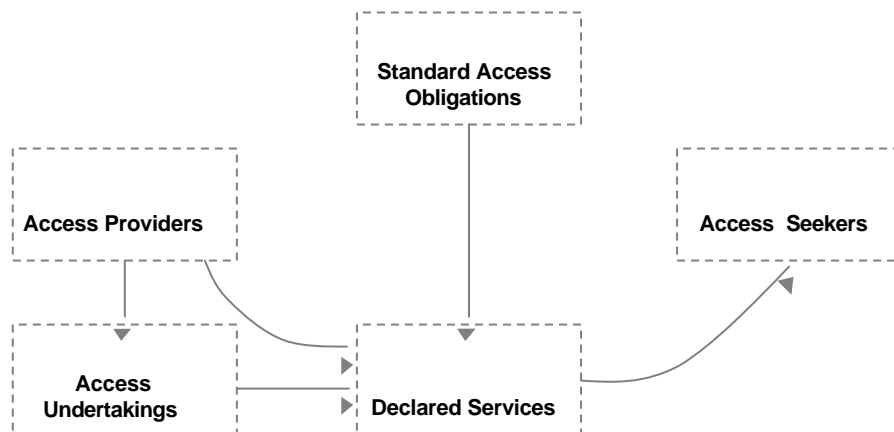
- Section 152 of the Australian Trade Practices Act 1974 (“TPA”) provides “any to any connectivity” as the basic interconnection policy objective
 - Any to any connectivity is achieved if each end-user who is supplied a service that involves communication between end-users is able to communicate, by means of that service with each other end-user who is supplied with the same or similar service, whether or not the end-users are connected to the same telecommunications network
- Part XIB of the TPA provides the interconnection legislative framework
 - Move towards general competition law and encourages industry self regulation
 - Access Providers must provide declared services when reasonably requested by Access Seekers
 - Standard Access Obligations apply
 - Australia Competition and Consumer Commission (“ACCC”) may determine terms and is responsible for dispute resolution

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Legislative and Regulatory Background

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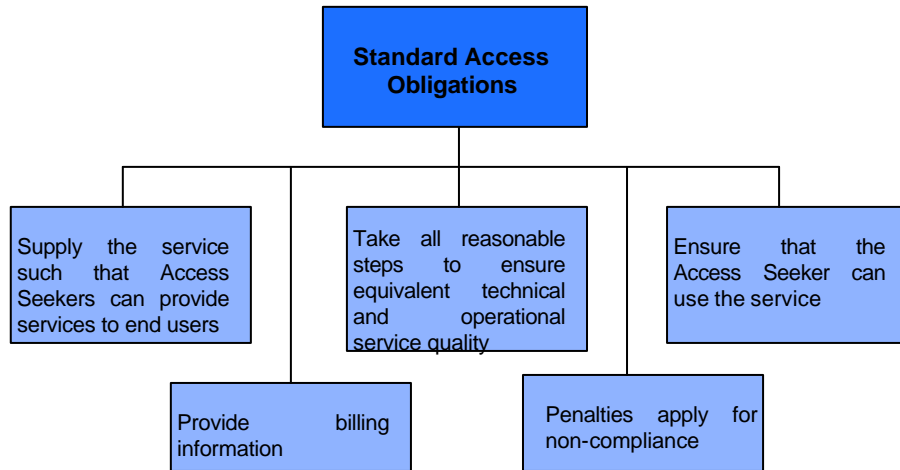
Key Definitions - Declared Services

- Declared Services are:
 - List of interconnection services required by Access Seekers
 - Interconnection Services include Mobile and Fixed PSTN origination and termination services
 - Industry participates in service declaration process
 - Standard Access Obligations apply

Key Definitions - Access Undertaking

- Access Undertaking:
 - The packaged offering of an interconnection service
 - Access Seekers buy the interconnection service in the same way as buying an end-user tariffed service
 - The ACCC approves access undertaking

Standard Access Obligations



G. Interconnection Regulation In Bangladesh

Legislative and Regulatory Background

- Section 31(2)(g) of *Bangladesh Telecommunications Act 2001* ("BTA") empowers the Bangladesh Telecommunication Regulatory Commission ("BTRC") to:
 - Issue guidelines on matters of interconnection among operators.
 - To determine, in appropriate cases, the interconnection conditions applicable thereto.
 - To resolve interconnection disputes.
- Section 47(1) of the BTA provides that an operator may establish interconnection between his telecommunication network with that of another operator.
- Section 47(2) of the BTA imposes an obligation on an operator to provide interconnection and access where 25% of the consumers in an area specified by the BTRC take service from more than one operator.

Interconnection and Access Obligations

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- The interconnection and access obligations set out in Section 47(2) of the BTA include:
 - Interconnection agreements shall be executed within three (3) months from the first day on which the new operator starts providing telecommunication service.
 - The operators shall execute interconnection agreements among themselves. An operator may apply to the BTRC to extend the time limit for the execution of the interconnection agreements.
 - The real cost in relation to universal service provided by operators of ordinary or cellular mobile telephone service shall be fixed and paid at a rate mutually agreed among the operators. In the event the operators fail to agree on the rate, the BTRC may fix the rate which shall be followed in making payment of the cost which is part of the total cost of interconnection.
 - The operators shall act in a non-discriminatory and transparent manner in determining the terms and conditions of interconnection.

Interconnection and Access Obligations

...2

- The interconnection and access obligations set out in Section 47(2) of the BTA include:
 - Copies of interconnection agreements shall be delivered to the BTRC and interested parties.
 - Charges realizable for the use of interconnection shall be fixed by way of adjusting the actual cost and a reasonable rate of profit from the investment in interconnection; and the manner of fixation of such charge shall be transparent.
 - The operators shall keep a separate account for each interconnection so that all the heads of expenditure for the interconnection and the income therefrom may be specifically identified.

The BTRC's Role in Regulating Interconnection

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- Section 47(5) of the BTA provides for the BTRC in appropriate cases, to take the following actions on its own motion :
 - May direct any operator to present his cost of interconnection and the justification for charges for the interconnection services.
 - Shall ensure adequate number of interconnections for the purpose of protecting the interests of consumers.
 - Shall publish a directory containing model interconnection agreements and guidelines.
- Section 47(4) of the BTA provides for the BTRC to determine the terms of interconnection agreement as it considers appropriate where operators who are bound to execute interconnection agreements, cannot agree to the terms for interconnection and take the matter to the BTRC.
 - Note that the BTRC may also on its own motion, take up the matter and determining the terms for interconnection.

The BTRC's Role in Regulating Interconnection

...2

- Section 47(5) of the BTA provides for the BTRC in appropriate cases, to take the following actions on its own motion :
 - Interfere with any matter relating to interconnection of any operator, for the purpose of ensuring public interest.
 - Direct the concerned parties to an existing interconnection agreement to amend the terms thereof.
 - Specify the time limit for holding discussion and finalising a proposed interconnection agreement.
 - Take action against establishing or maintaining a monopoly created by way of interconnection.

Thank You...

**I would be pleased answer to any queries
you might have ...**