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# **Telecommunications Network Interconnection in Hong Kong**

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# Significance of Interconnection

- Interconnection allows users of one network to communicate with users of other networks
- The vital prerequisite for a liberalized and competitive telecom market

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# Licensing & Regulatory Issues

- General Condition 13 of Fixed Carrier Licence/FTNS licence specifies the requirements for interconnection
- Section 36A of the Telecommunications Ordinance (Cap. 106) empower TA to make a determination under Section 36A whenever there is a dispute on interconnection charges between any two FTNS operators

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# Licensing & Regulatory Issues

- In brief, the TA may appoint an "Interconnection Determination Committee" (IDC) to consider the request for determination, including the written request to the TA, details of the negotiations and proposed agreements from the parties involved
- Members of the Committee shall consist of government staff (from OFTA and other government departments) and when necessary, outside experts/consultants

# Hong Kong's Regulatory approach on Interconnection

- Interconnection configuration is divided into two main types according to the different physical modes of interconnection
  - (a) Type I - Interconnection between Network Gateways
  - (b) Type II - Interconnection at Points in the Local Loop
- Telecommunications Authority (TA) issued Statement No. 7 on “Carrier-to-Carrier Charging Principles” which details interconnection arrangements

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# Hong Kong's Regulatory approach on Interconnection

- Hong Kong adopted a light-handed, market driven regulatory approach
- Interconnection is mandated as licensing conditions for fixed network operators (FNO)
- Interconnect issue should be negotiated commercially in the first instance. But when negotiations fails, TA may intervene

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# Dispute Resolutions

- Mediation
  - TA would be prepared to facilitate negotiations by way of conciliation and mediation, without formal intervention
  - Commercially negotiated arrangements are considered more sustainable than those imposed by determination

# Dispute Resolutions

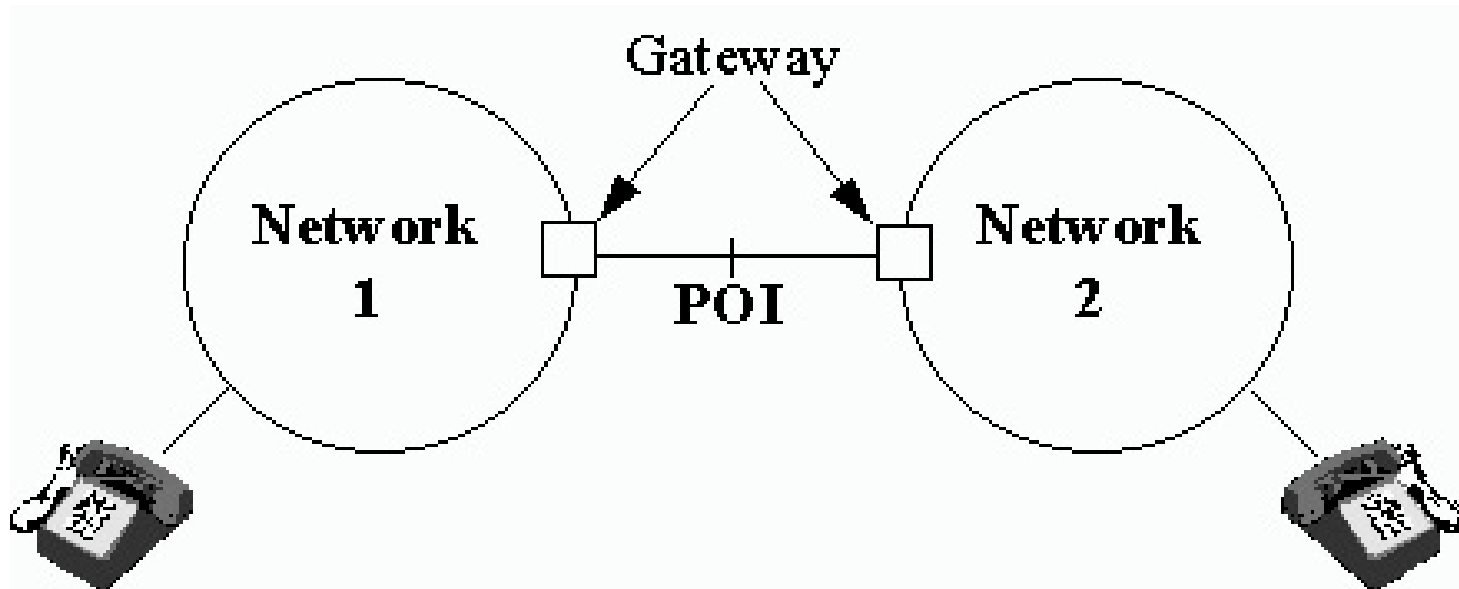
- **Determination by TA**
  - TA appoints an IDC to consider upon the request for determination
  - All the relevant parties will be given chances to make representation

# Dispute Resolutions

- **Determination by TA (Cont'd)**
  - The IDC will recommend to the TA, considering the economic and social benefit, regulatory implications, efforts made by parties to secure an agreement, chance of an agreement without intervention, and the consequence of non-intervention
  - The TA makes his decision accordingly and Section 36(B) allows the TA to issue directions to licensees for them to comply with determination

# Type I interconnection

- Type I Interconnection is defined as an interconnection between network gateways of two **core networks**



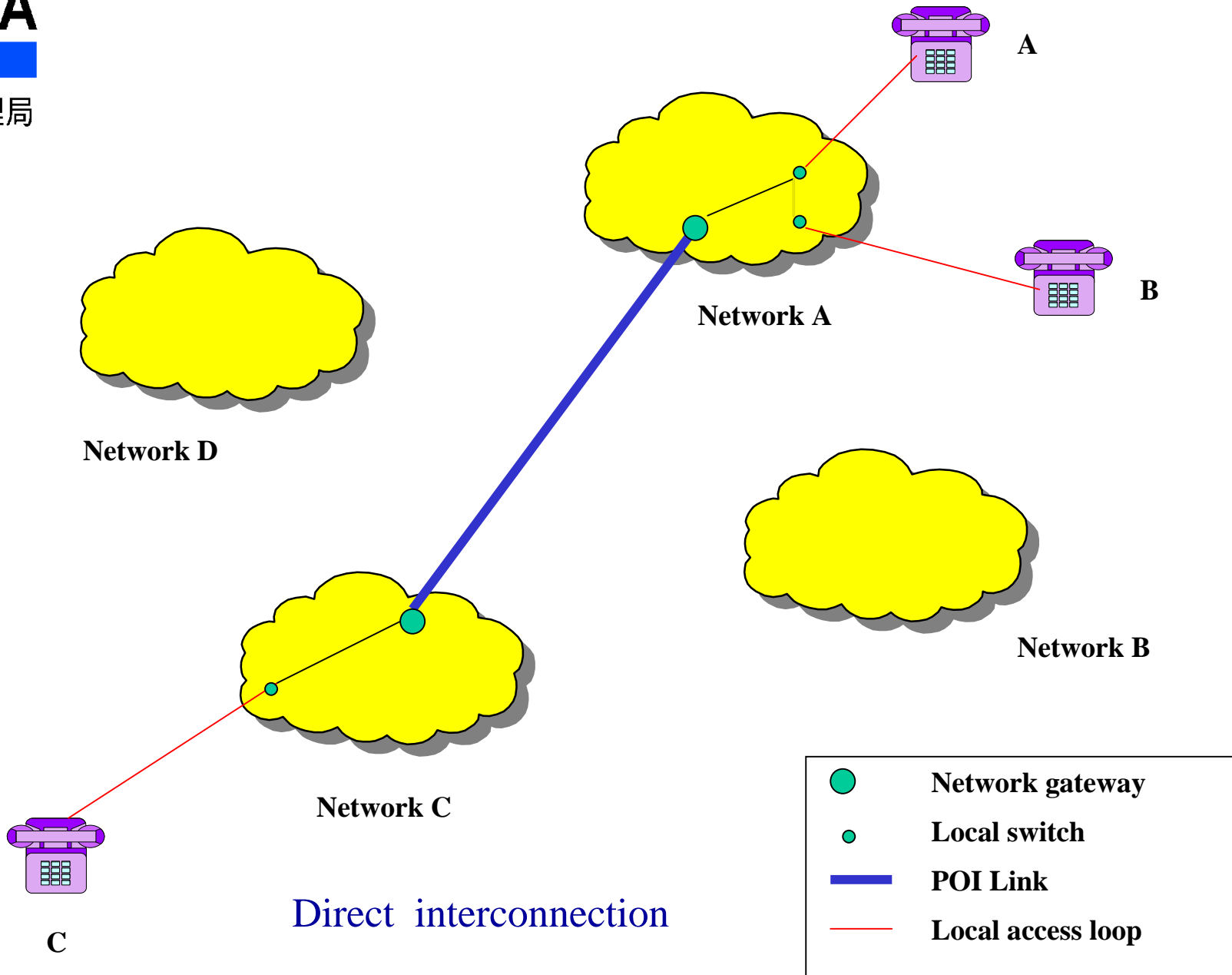
# Type I Interconnection

- Customers connected to any network can communicate with customers or access service providers (e.g. ISP, ETS and other VAS providers) connected to other networks. Such capability is called the “any-to-any” connectivity
  - (a) Direct interconnection
  - (b) Indirect interconnection - traffic routed via a third network

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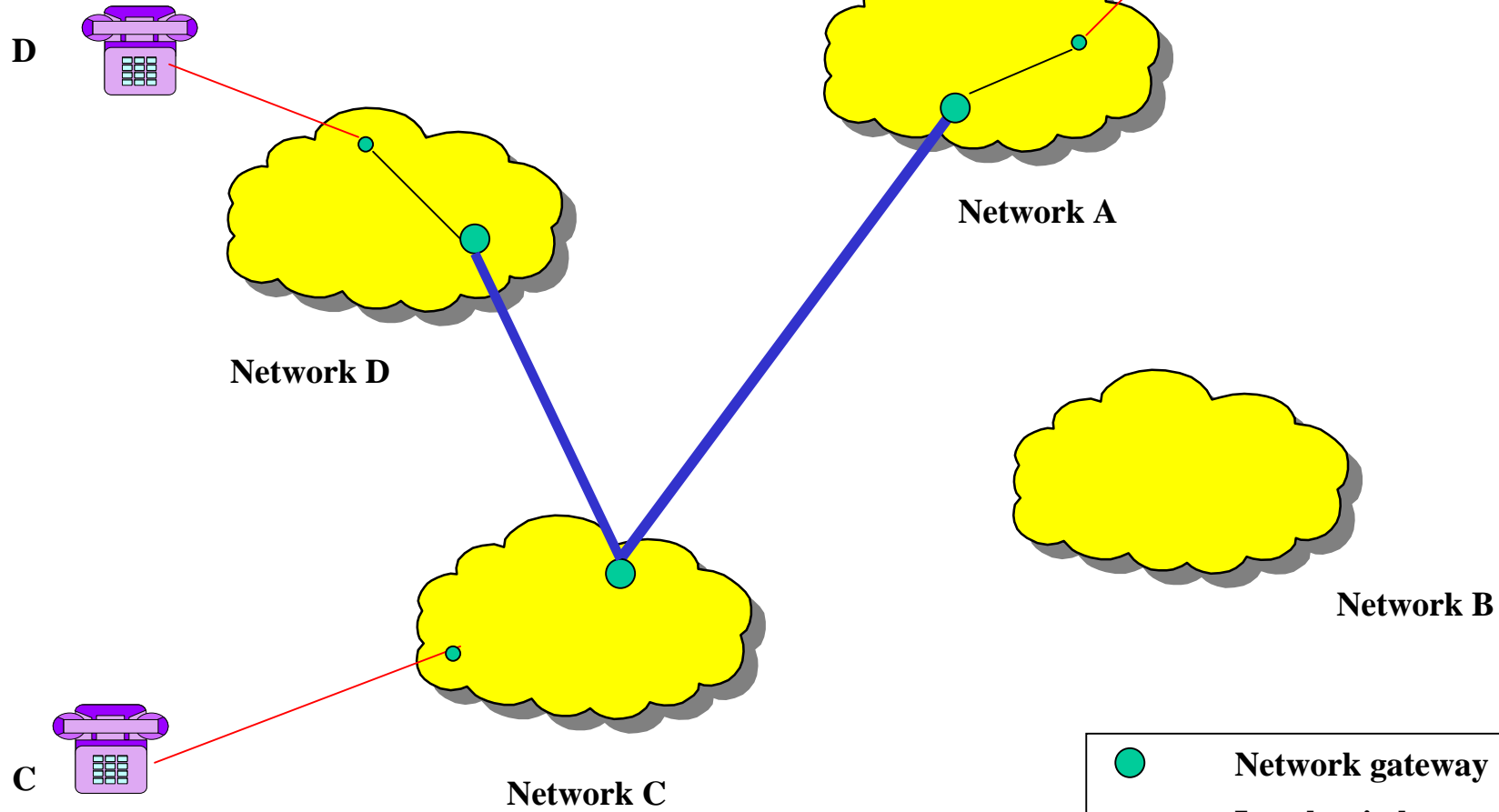
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Indirect interconnection - customer access

	Network gateway
	Local switch
	POI Link
	Local access loop

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# Type I Interconnection

## Basic principles of Type I Interconnection

- Carriers have equal responsibility in ensuring that the two networks are interconnected promptly and efficiently
- “Any-to any” connectivity
- Interconnection upon request of another FTNS operator

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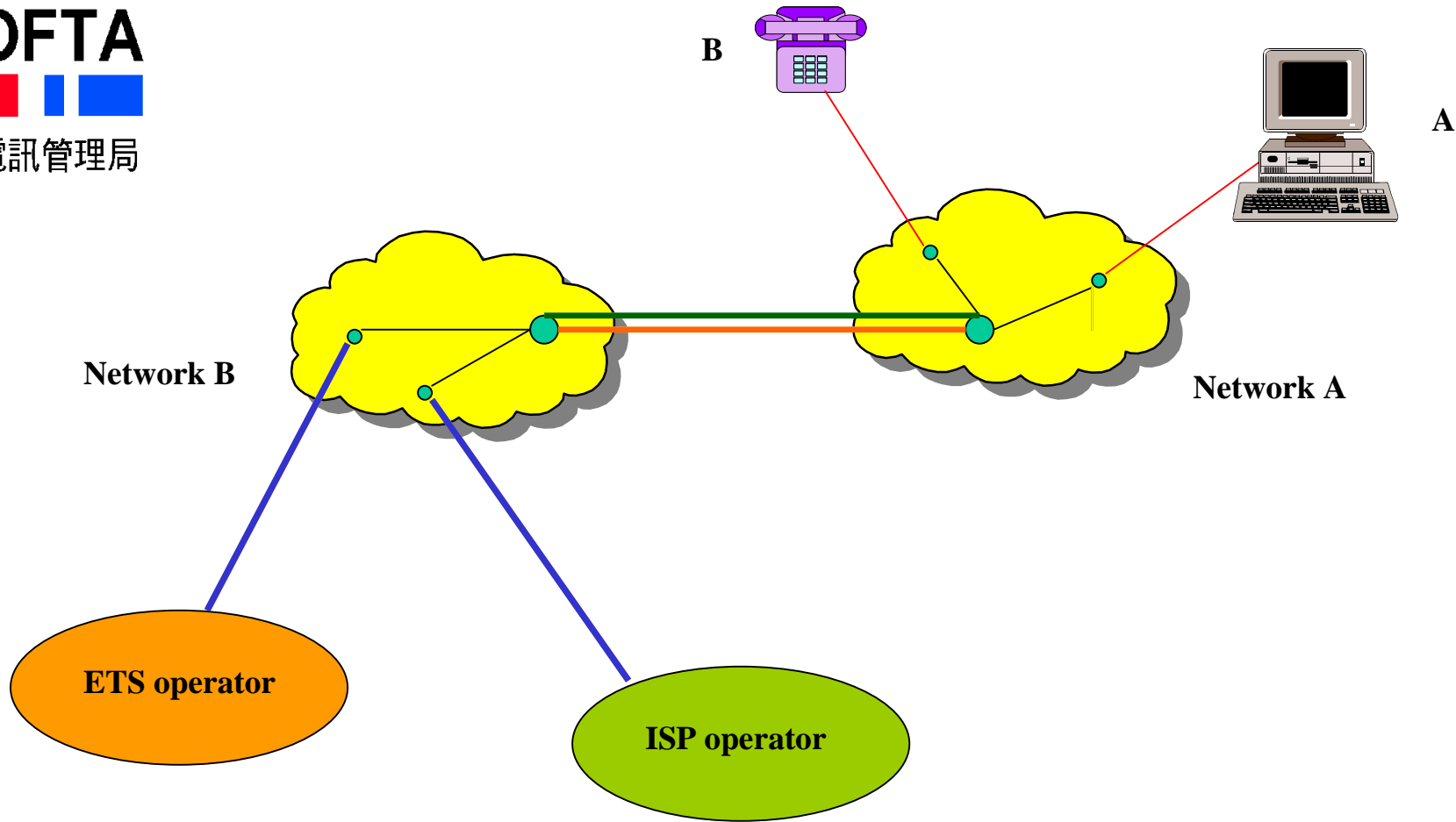
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## Point of Interconnect (POI)

- POI is a notional point in the mid-point of the link interconnecting the gateways of two networks
- Gateways can be toll exchanges, tandem exchanges, local exchanges or dedicated interconnection gateways (ICG)

## POI links

- Separate links for different traffic types (e.g. **calling card / IDD traffic, internet access traffic, local voice traffic and etc.**)
- Dynamic traffic pattern
- Link capacity to be dimensioned through traffic forecasting and traffic engineering theory so as to meet the specified Grade of Service (GOS)



Separate links for different traffic types

- |  |                     |
|--|---------------------|
|  | Network gateway     |
|  | Local switch        |
|  | Leased circuits     |
|  | POI links (for ETS) |
|  | POI links (for ISP) |

# Services supported over Type I Interconnection

- Transfer of Calling Line Identity (CLI)
- Number Portability Service
- Emergency Call Service (i.e. 999 & 992)

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## **Broadband Type I interconnection**

- Between gateways core networks (e.g. ATM networks) which are different from that of legacy narrowband fixed networks (e.g. PSTN & ISDN)
- Support bandwidth-on-demand applications
- Optical fibre is the main physical media
- Further studies on the technical feasibility and the standards and commercial products necessary before mandated by TA

# Type II Interconnection

- Type II interconnection is defined as interconnection between FTNS operators in the local loop (the last mile), also known as local loop unbundling
- when customer of one network want to move to a new network, interconnection at local loop level may be necessary

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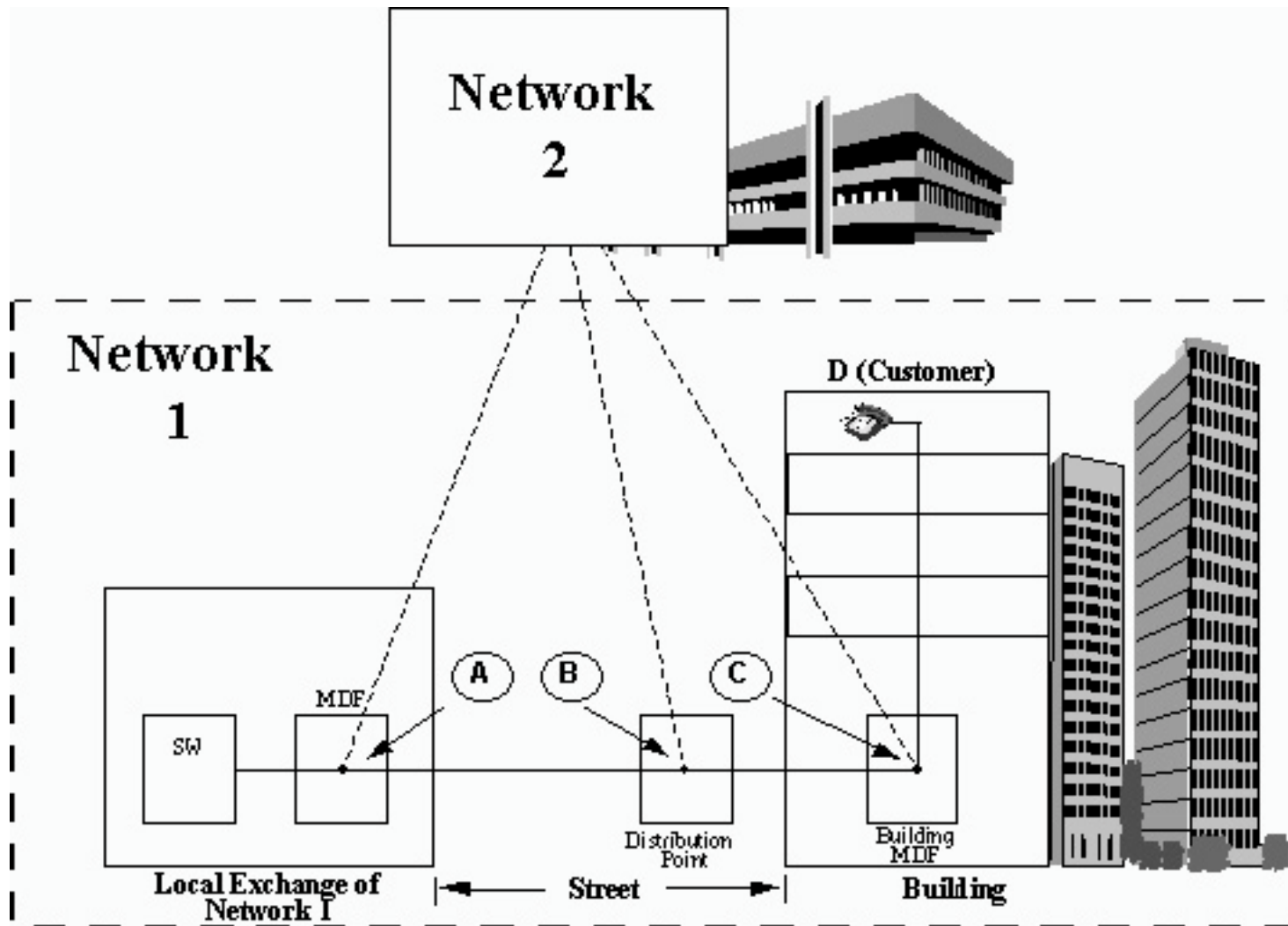


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# Type II Interconnection

- co-location of facilities at another operator's exchange building (A)
- access to copper-based local loops (B)
- In-building wiring system (C)

# Type II interconnection



# Type II Interconnection

- Four wireline-based FTNS operators are obliged to make available their copper-based local loops for Type II Interconnection
- For both narrowband and broadband interconnection, Type II Interconnection currently does not apply to optical fibres in customer access networks

# Type II Interconnection

- The following operators are not entitled to Type II interconnection in the form of exchange co-location and copper-based local loop access
  - wireless FTNS licensees
  - HK Cable TV which provides service on cable modem
  - local fixed network licensees with their licence effective after January 2003

# Type II Interconnection

## Why Type II Interconnection?

- Solution to the proper “bottleneck” facilities
- Enable customers to be served by new entrants’ networks which may otherwise be impossible (e.g. remote areas, impractical to install second local loop)
- Efficient use of existing facilities

# Type II Interconnection

## Basic Principles

- Required only upon customer requests
- Facilities collocation
- Prompt, efficient and “invisible” interconnection

# Type II Interconnection

- Type II Interconnection for narrowband introduced as from July 1995 when competition was introduced into the local fixed network market
- Extended to broadband services by TA Statement on “Broadband Interconnection” issued in November 2000

# Type II Interconnection

## Considerations of New Entrants - Build vs Buy

- To serve customers by Type II Interconnect (local loop access)
  - less initial cost, faster provision time
- To serve customers by self-built facilities
  - service and technology not limited by the existing facilities owner

# Consultation on Type II Interconnection

- In view of the changes of market environment, a consultation on Type II interconnection initiated in May 2003 to examine means to promote investment and competition, charging principles and best means to continue Type II interconnection

# Consultation on Type II Interconnection

## Facilitating Effective Competition and Promoting Investment

- heavily relied on Type II Interconnection ~47% of services provided by new entrants
- bottlenecks continue to exist making Type II Interconnection a solution to overcome

# Consultation on Type II Interconnection

Whether and in what way should Type II  
interconnection be continued

- location of point of interconnection - obligations for co-location, in-building and outside building
- technology - extend to fibre-based or wireless-based facilities?
- nature of services - narrowband and broadband services

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## Market Share of Narrowband Services (as of end 2002)

	No. of lines connected via Type II Interconnection	No. of lines connected via self-built network	Total no. of lines	Market Share
Four new entrants	329,006	375,724	704,730	<b>18.3%</b>
<b>% of total lines provided by new entrants</b>	<b>47%</b>	<b>53%</b>		
Incumbent	0	3,137,017	3,137,017	<b>81.7%</b>
Sub-total number of lines by provision method	329,006	3,512,741	3,841,747	100%
<b>% of total lines provided</b>	<b>8.6%</b>	<b>91.4%</b>		

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## Market Share of Broadband Services

(as of end 2002)

	No. of LMDS/xDSL/HF C/FTTB Lines	Market Share
New entrants	452,342	<b>44.7%</b>
Incumbent	559,422	<b>55.3%</b>
<b>Total broadband lines</b>	<b>1,011,764</b>	<b>100%</b>

# Consultation on Type II Interconnection

**To examine the different Charging Principles**

- LRAIC
- Total Service LRAIC (TSLRIC) adopted currently for Type II Interconnection
- Fully Distributed Cost (FDC)

# Consultation on Type II Interconnection

- TSLRIC mark up - between TSLRIC and FDC
- Retail minus - sets price cap at contemporary retail price minus costs of retail activities
- Opportunity cost incurred by foregoing the chance of self-building

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# Broadband Type II Interconnection

- The two broadband incumbent operators provide virtually full coverage of buildings in Hong Kong, so that many end-users only accessible through them
- Broadband Interconnection is the most effective way to introduce competition at an early stage

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# Broadband Type II Interconnection

- Interconnection to the customer access network
- TA decided to mandate broadband Type II interconnection
- Full bandwidth option - leasing of the whole bandwidth of the local loop
- Partial bandwidth option - shared access, band limit for broadband transmission to allow provisioning of both telephone and broadband services

# Charging Principles

- Operators must compensate the cost incurred to other operators with interconnection
- Encourage efficient use of facilities and minimize wasteful and duplicated facilities
- Charges for interconnection will be based on relevant cost
- The relevant cost should be measure on the long-run average incremental cost (LRAIC) model

# Charging Principles

- Long Run Average Incremental Cost (LRAIC)
  - Incremental cost
  - Long run incremental cost  
(Total cost of the carrier when providing interconnection -  
Total cost of the carrier without providing interconnection)  
/ total conveyance of interconnected services (e.g. minutes,  
traffic, calls etc)

# LRAIC

- Total service delivered  
= services delivered for its own +  
services delivered for interconnected service
- Cost includes : Depreciation of assets, invested capital, cost of capital, and incremental operating cost
- Relevant cost should make reference to incumbent carrier's current cost and replacement cost
- Include cost of capital - as reasonable return for the carrier's risk of network investment

# Charging Principles - Type I Interconnection

## Establishment Charge

- Cost in establishing physical link
  - calculated by LRAIC model
  - shared by interconnecting carriers
- Cost of network conditioning
  - to ensure network security and integrity, standardisation, equal access, change numbering system and the provision of calling line identification (CLI) etc Cost borne by carrier for conditioning of their own networks

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# Charging Principles - Type I Interconnection

## Usage Charge

- Interconnection usage costs relate to the recurrent costs incurred by carriers in passing traffic from one network to another via an established interconnection link and originating or terminating that traffic within their networks

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# Charging Principles - Type II Interconnection

- Neither too high to deter competition nor too low to discourage new entrants to invest in facilities
- Facilities already exists - concern only with the cost of existing facilities rather than new construction

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# Charging Principles for VAS and Mobile Services

- VAS and mobile network operators should pay fixed network operators interconnection fee
- Interconnection charge or called Public Non-exclusive Telecommunications Service (PNETS) charge paid to FNO
- Only PNETS charge paid to dominant carrier is regulated
- Fully distributed cost (FDC) model

# Interconnection Charges

Interconnection between mobile and fixed	HK\$79 per line per month plus a usage charge of 4.5 cents per minute of line occupancy for non-transit services and 1.3 cents for transit services
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Interconnection between VAS and fixed	HK\$79 per line per month plus a usage charge of 2.0 cents per minute of line occupancy
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# Comparison of Cost Models

## LRAIC

- suitable for developing market
- no large indirect cost incurred on the incumbent operator

## FDC

- suitable for mature market
- new entrants have to share the indirect cost with the incumbent operator

# Comparison of Cost Models

## Interconnection Cost Calculation

- Fixed Network Operator - LRAIC
- VAS/Mobile Services - FDC

**The End**

**Thank You**