

Number Portability in Hong Kong

By Lawrence KWAN
Chief Telecom Engineer
Office of the Telecommunications Authority
Hong Kong, China

Seminar on ‘Number Portability, Infrastructure Sharing, Licensing,
Interconnection and Pricing Issues in Telecommunications Market of India’

October 6-7, 2003

India Habitat Centre, New Delhi

Content

- Telecommunications Market in Hong Kong
- Government Policy Objectives
- Operation of FNP in Hong Kong
- Operation of MNP in Hong Kong
- Results of Number Portability
- MNP for New Services

Content (Cont.)

- Our Experience
- Q&A

Telecommunications Market in Hong Kong

Local Fixed Telecommunications
Network Services (FTNS)

Local Fixed Telecommunications Network Services (FTNS)

- The local FTNS market deregulated in July 1995 with 4 FTNS operators
- In January 2003, the FTNS market is further liberalised with new licences for operation of wireline FTNS.

OFTA



電訊管理局

Local Fixed Telecommunications Network Services (FTNS)

- As of August 2003, there are 11 FTNS operators - 8 wireline FTNS operators, 2 wireless FTNS operators and 1 hybrid optical-coaxial cable network operator
- As of June 2003, there are 3.81 million telephone lines in HK - about 57 lines per 100 inhabitants

Telecommunications Market in Hong Kong

Mobile Market in Hong Kong

Mobile Market in Hong Kong

Total 6 mobile network operators
running 11 networks :

5 PMRS networks:

3 GSM900, 1 DAMPS IS-136, 1 CDMA
IS-95, all in 800 - 900 MHz bands

6 PCS networks:

6 GSM1800, all in 1.7 - 1.9 GHz bands

Mobile Market in Hong Kong

4 licences for 3G mobile services
granted in 2001, expected services
commencement in 2003

Mobile Virtual Network Operator
(MVNO) licences issued for
provision of mobile services with the
radio facilities of an MNO from 2001

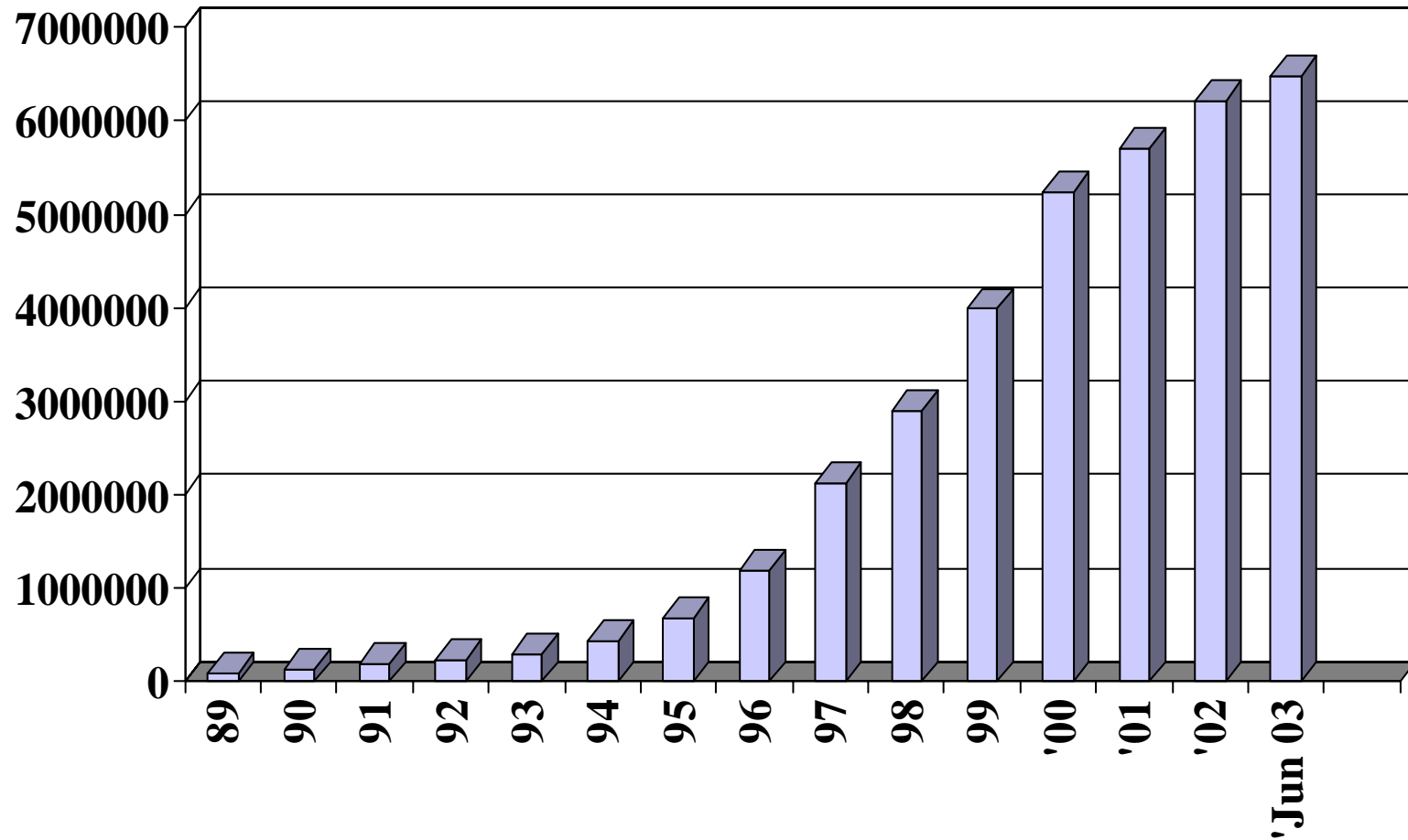
OFTA



電訊管理局

Mobile Market in Hong Kong

No. of Subscribers



Mobile Market in Hong Kong

PMRS and PCS customers

	<u>End 01</u>	<u>End 02</u>	<u>Jun 03</u>
No. of Subscribers:	<i>5.70 M</i>	<i>6.22 M</i>	<i>6.48 M</i>
Population:	<i>6.76 M</i>	<i>6.79 M</i>	<i>6.82 M#</i>
Penetration:	<i>84.32%</i>	<i>91.61%</i>	<i>95.01%</i>

provisional figure

Government Policy Objectives

- The widest range of quality telecommunications services should be available to the community at reasonable cost;
- Telecommunications services should be provided in the most economically efficient manner possible; and
- Hong Kong should serve as the pre-eminent communications hub for the region

OFTA



電訊管理局

Operation of Fixed Number Portability (FNP) in Hong Kong

Fixed Number Portability

Definition of FNP:

- FNP is the ability for customers to retain their assigned fixed telephone numbers when moving location (geographical portability) or changing the subscription from one fixed network operator to another fixed network operator (operator portability)

Fixed Number Portability

Countries implementing fixed number portability (FNP)

- **Hong Kong SAR** in 1995
- UK, Finland in 1997
- Australia, Germany, France, Austria and USA in 1998
- Netherlands and Denmark in 1999
- Singapore in 2000

Fixed Number Portability

- In Hong Kong, FNP was implemented by simple call forwarding as interim solution (Jul 95 - Dec 96)
- Distributed Database approach as final solution (Jan 97 onwards):
 - On-line gateway number (GN) database for operation
 - Off-line administration database (AD) for updating and reference purposes

Fixed Number Portability

Countries implementing fixed number portability (FNP) (cont'd)

- European commission's ONP-Directive 98/61/EC states that EU member states should ensure the FNP facility is available by 1 January 2000, unless with exemption
- Greece, South Korea in 2003

OFTA



電訊管理局

Fixed Number Portability

- GN database -- The online database that provides translation of the ported number into gateway number (GN)
- Administration database (AD) -- The database that stores all working ported-in and ported-out numbers together with their corresponding information. Numbers that have never been ported will not be stored in the AD

Fixed Number Portability

Gateway Number (GN)

- A number for routing a call to a ported number from the originating or transit network to the recipient network
- GN is set by the Recipient Network Operator (RNO)

Fixed Number Portability

Use of Gateway Numbers (GN) for Routing

Two formats:

GN = Network Identifier (NI) + Directory Number
(11 digits) (3 digits) (8 digits)

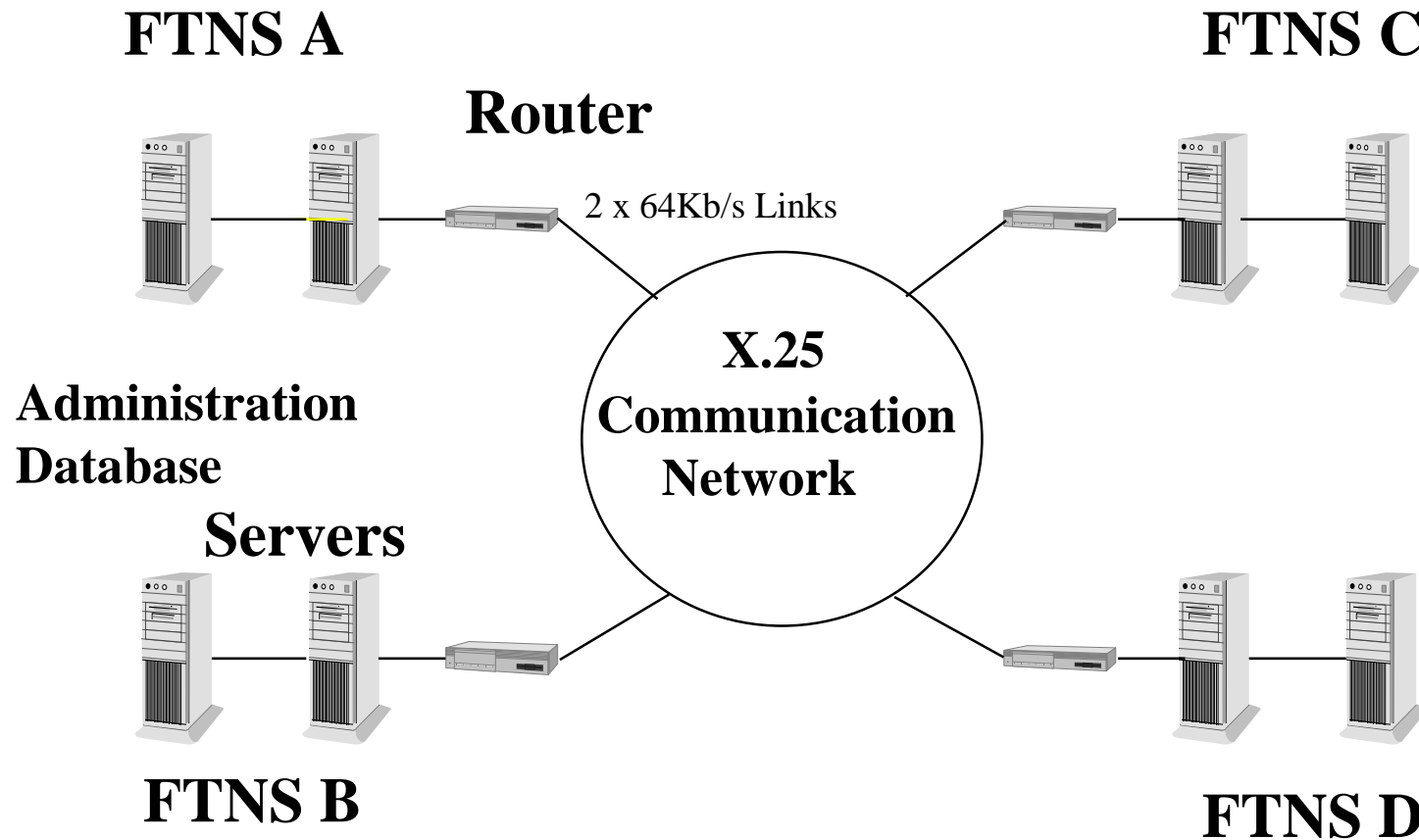
e.g. GN= 140 (NI) + 2123 4567 (DN)

GN = Network Number (NN) (9 or 10 digits)

eg 40 XXXX XXXX, a separate domain from
Directory Number

NI, NN to identify the network of RNO

Fixed Number Portability

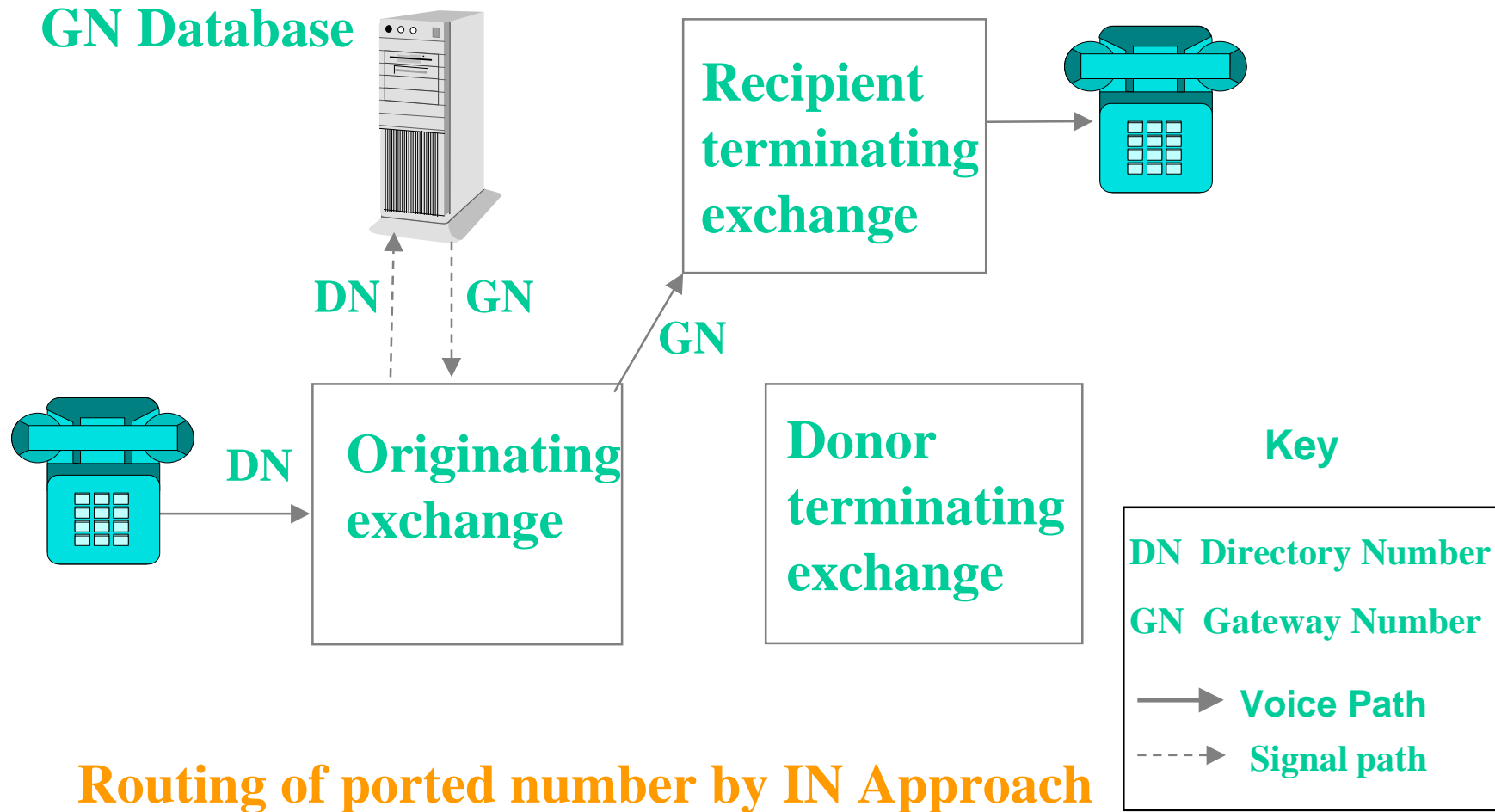


Inter-Operator AD Communications Network

Fixed Number Portability

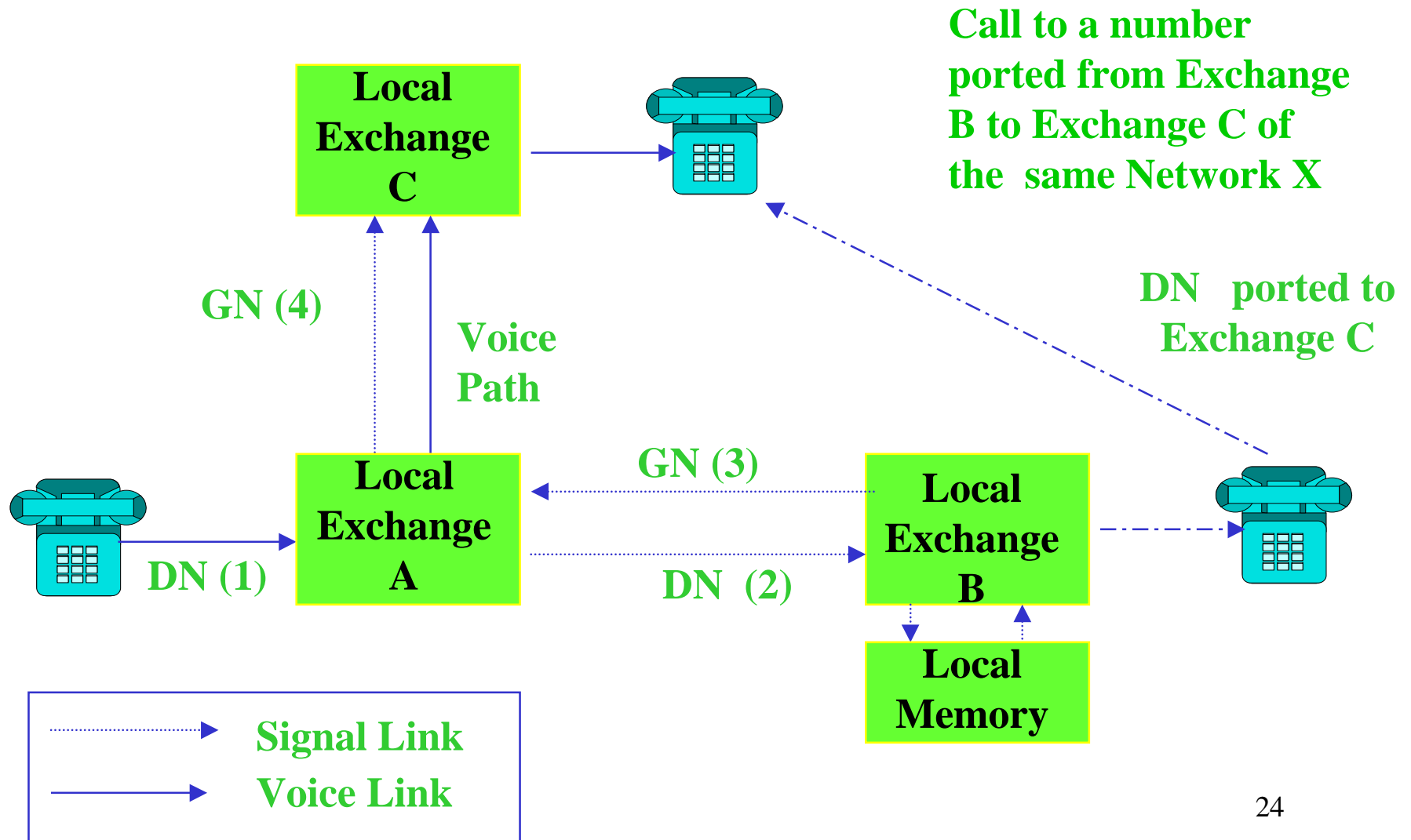
- Each of 4 fixed network operators is currently operating its own Administration Database (AD) for the provision of fixed number portability
- In the case of MNP, however, some mobile network operators initially did not have its own AD and GN databases but hired the database service from fixed network operator for the provision of MNP service. Later on, these operators built their own databases

Fixed Number Portability

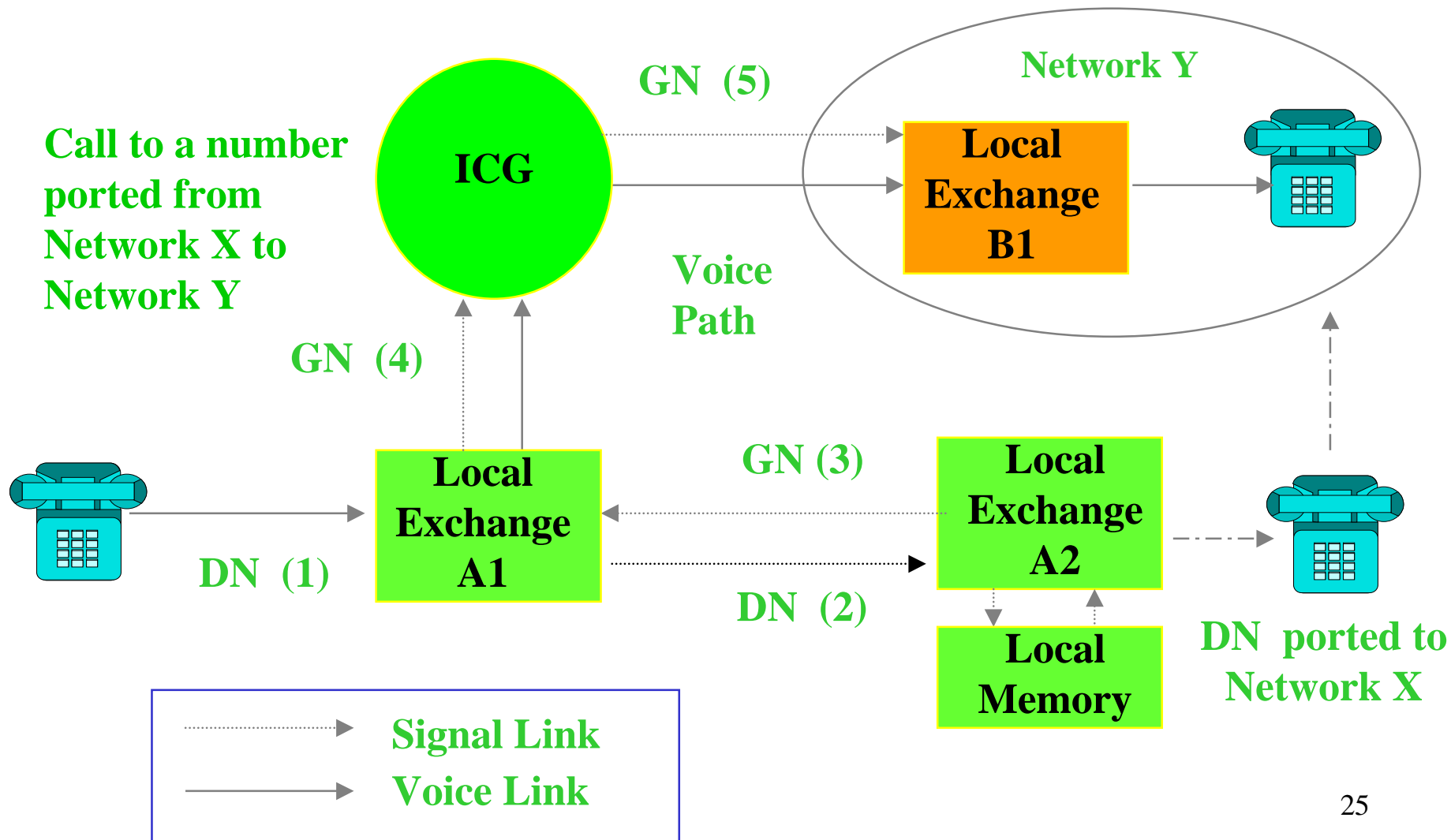


Routing of ported number by IN Approach

Fixed Number Portability



Fixed Number Portability



OFTA



電訊管理局

Fixed Number Portability

Information stored in AD

- Directory Number (DN)
- Gateway Number (GN)
- Recipient Network Operator (RNO)
- Donor Network Operator (DNO)
- Original DNO
- Original Type of Service
- Existing Type of Service
- Changeover Date
- Termination Date
- RNO / DNO Reference Serial Number

Fixed Number Portability

Response times

- (a) if the DNO receives an order before 12:00, it should respond by 17:00 of the next day;
- (b) if the DNO receives an order between 12:00 to 17:00, then it should respond by 12:00 of the day after next
- (C) if no verification problem, the RNO will send an Advice of Portable Number (APN) with the cut-over details to all the concerned Network Operators including the DNO at least 4 calendar days in advance of the agreed cut-over date

Fixed Number Portability

Cost Recovery Principles

- Each operator bears the system setup cost
- Each operator bears additional conveyance costs
- Per line setup costs paid by RNO to DNO

OFTA



電訊管理局

Operation of Mobile Number Portability (MNP) in Hong Kong

OFTA



電訊管理局

Mobile Number Portability

Definition of MNP:

- MNP is the ability for customers to retain their assigned mobile telephone numbers when changing the subscription from one mobile network operator to another mobile network operator.

OFTA



電訊管理局

Mobile Number Portability

Benefits of MNP:

- MNP would remove the last major obstacle of freedom of choice by customers and would promote fair and effective competition in the mobile market.

Mobile Number Portability

Introduction of MNP in other countries

- Singapore, simple call forwarding, 1997
- UK, Netherlands, signal relay solution, 1999
- **Hong Kong SAR**, distributed database, 1999
- Spain, Sweden, Switzerland, 2000
- Australia, Denmark, Italy, Norway 2001
- Belgium, Germany 2002
- Austria, France, Finland, Greece, Ireland, Luxembourg, Portugal, South Korea 2003
- USA- expected implementation in November 2003

OFTA



電訊管理局

Mobile Number Portability

Implementation of MNP in Hong Kong

Based on the consultant's findings and analysis

- On 1 March 1999, implementation of distributed database solution with FNO providing the look-up service and MNO's self-built database systems
- Set up MNP working group to finalize the technical specification and the implementation
- TA issued directions to both FNO and MNO to facilitate the implementation of MNP

OFTA



電訊管理局

Mobile Number Portability

Implementation of MNP in Hong Kong

Based on the consultant's findings and analysis

- TA issued directions to both FNO and MNO to facilitate the implementation of MNP in 1999
- The new 3G and MVNO licensees are obliged to facilitate MNP by their licensing conditions

Mobile Number Portability

Technical Consideration

- Originating network operator responsible for number conversion
- FNO provide database interrogation services for MNO
- MNO can built their own GN databases
- Distributed database solution

Mobile Number Portability

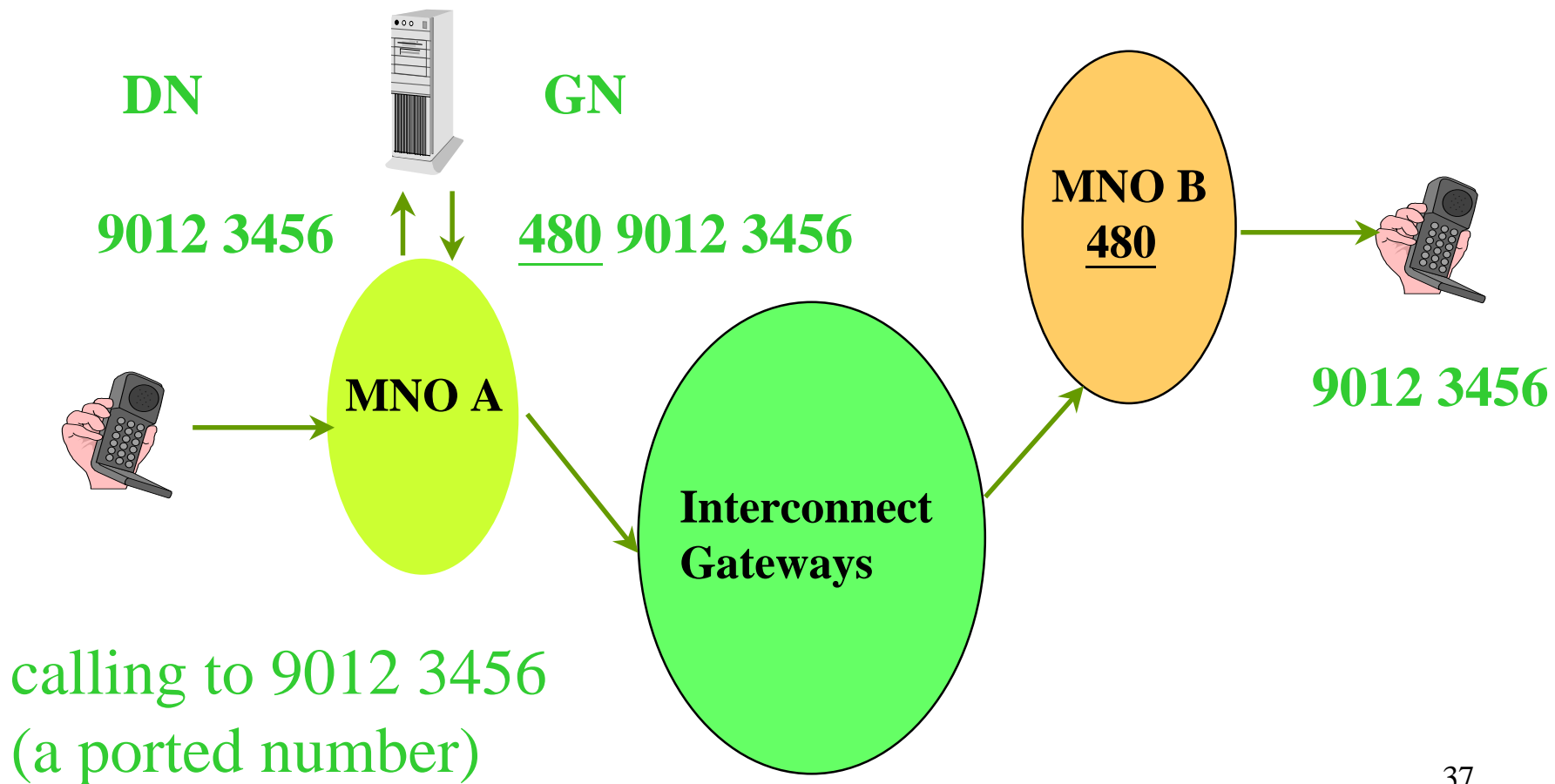
Gateway Number (GN)

A number for routing a call to a ported number from originating or transit network to recipient network

- GN number set by RNO
- DN - 8 digits e.g. 9012 3456
- GN - 10 to 12 digits e.g. 480 9012 3456

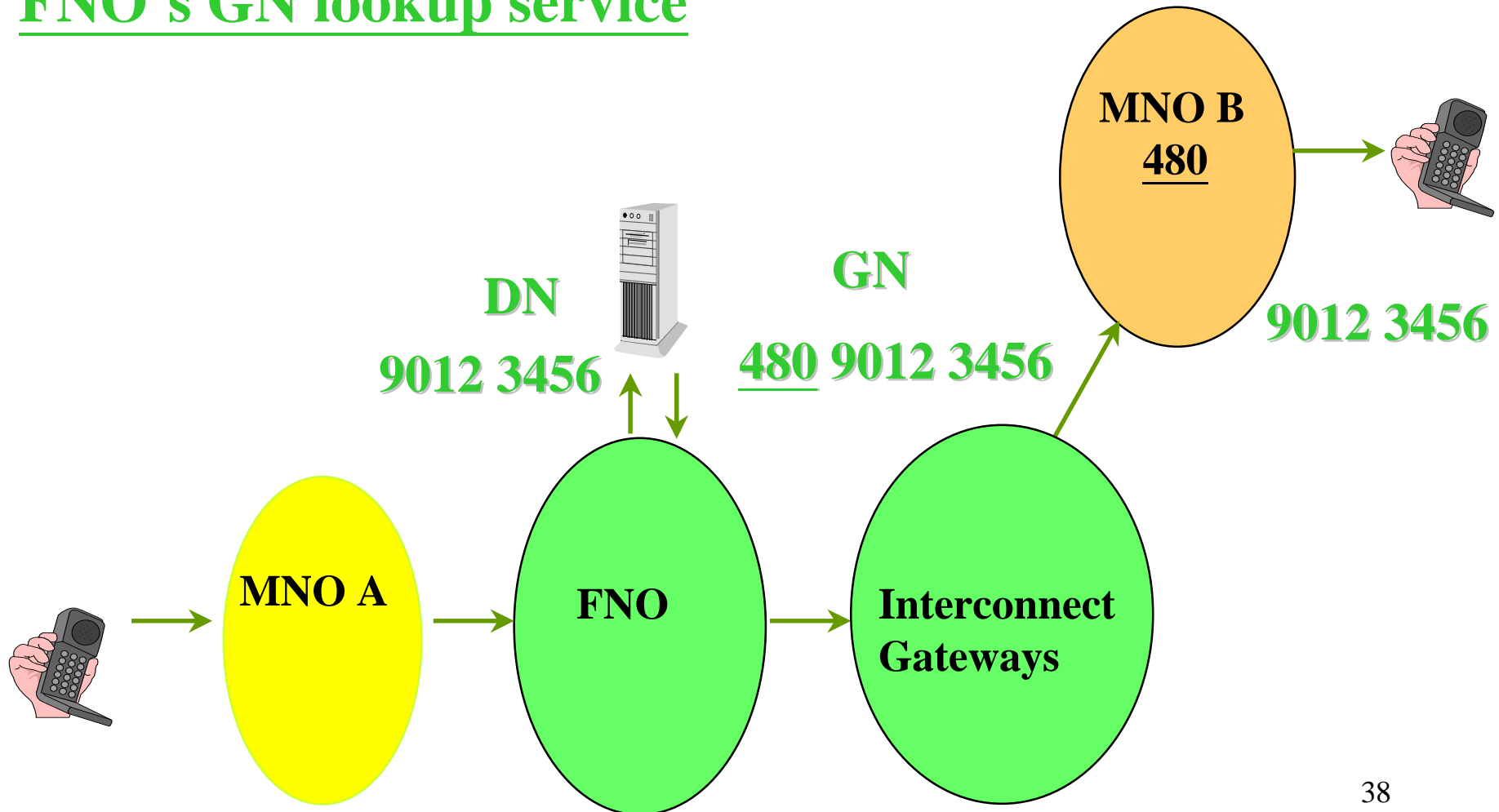
Mobile Number Portability

MNO Self-built GN Database System



Mobile Number Portability

FNO's GN lookup service



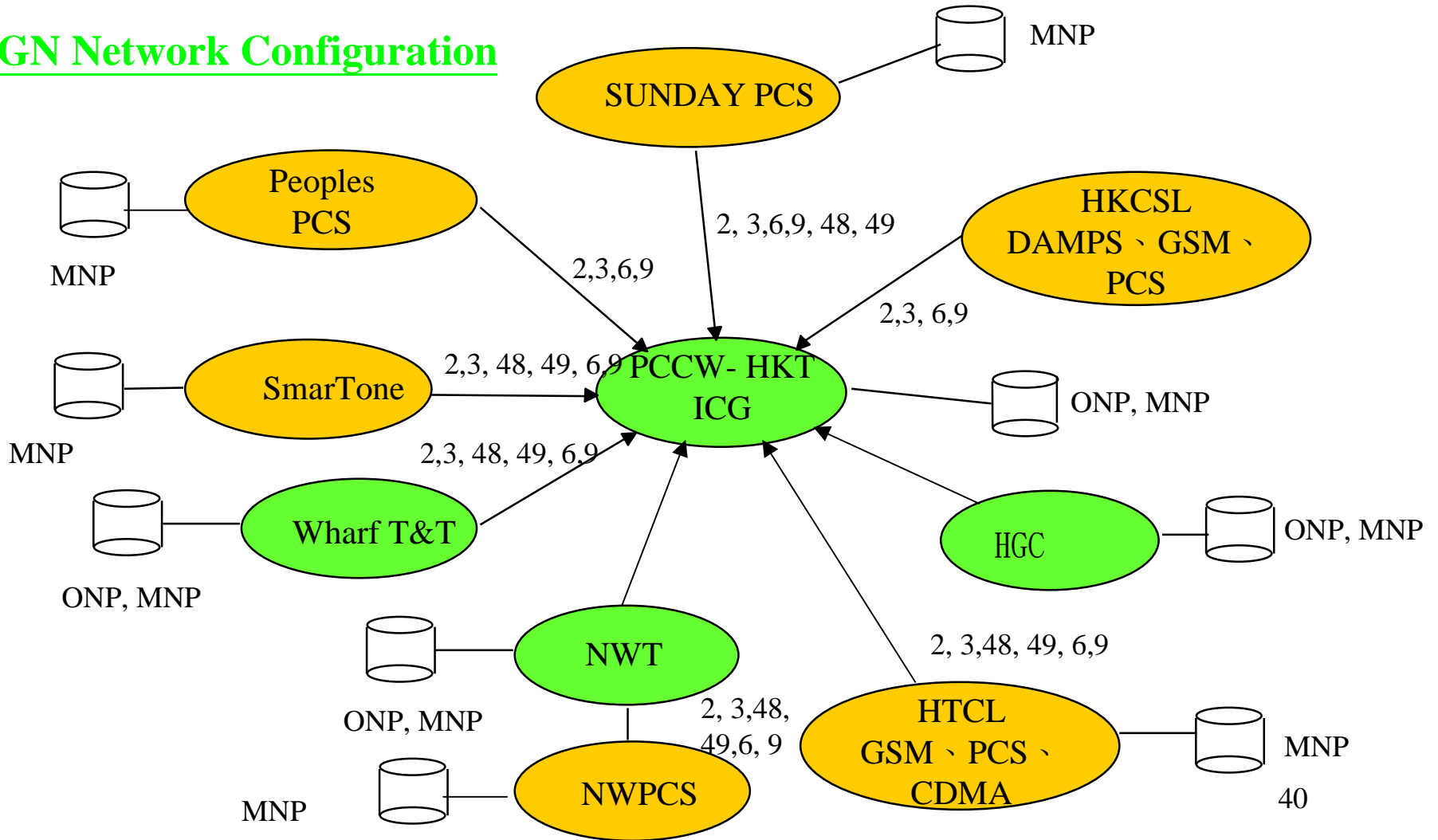
Mobile Number Portability

Interconnection of Mobile Networks

- Mobile networks are interconnected with each other via Interconnect Gateways (ICG) of FNO
- Each mobile network is connected with the International Interconnect Gateway (IICG) of Reach Networks for provision of IDD services

Mobile Number Portability

GN Network Configuration



OFTA



電訊管理局

Mobile Number Portability

Existing MNP Configuration in Hong Kong

- 9 AD systems

PCCW-HKT, HGC, Wharf T&T, NWT, SmarTone, Sunday, NWPCS, Peoples, HTCL

- 9 GN database systems

PCCW-HKT, HGC, Wharf T&T, NWT, SmarTone, Sunday, Peoples, NWPCS, HTCL

PCCW-HKT serving HKCSL

Administration Database (AD)

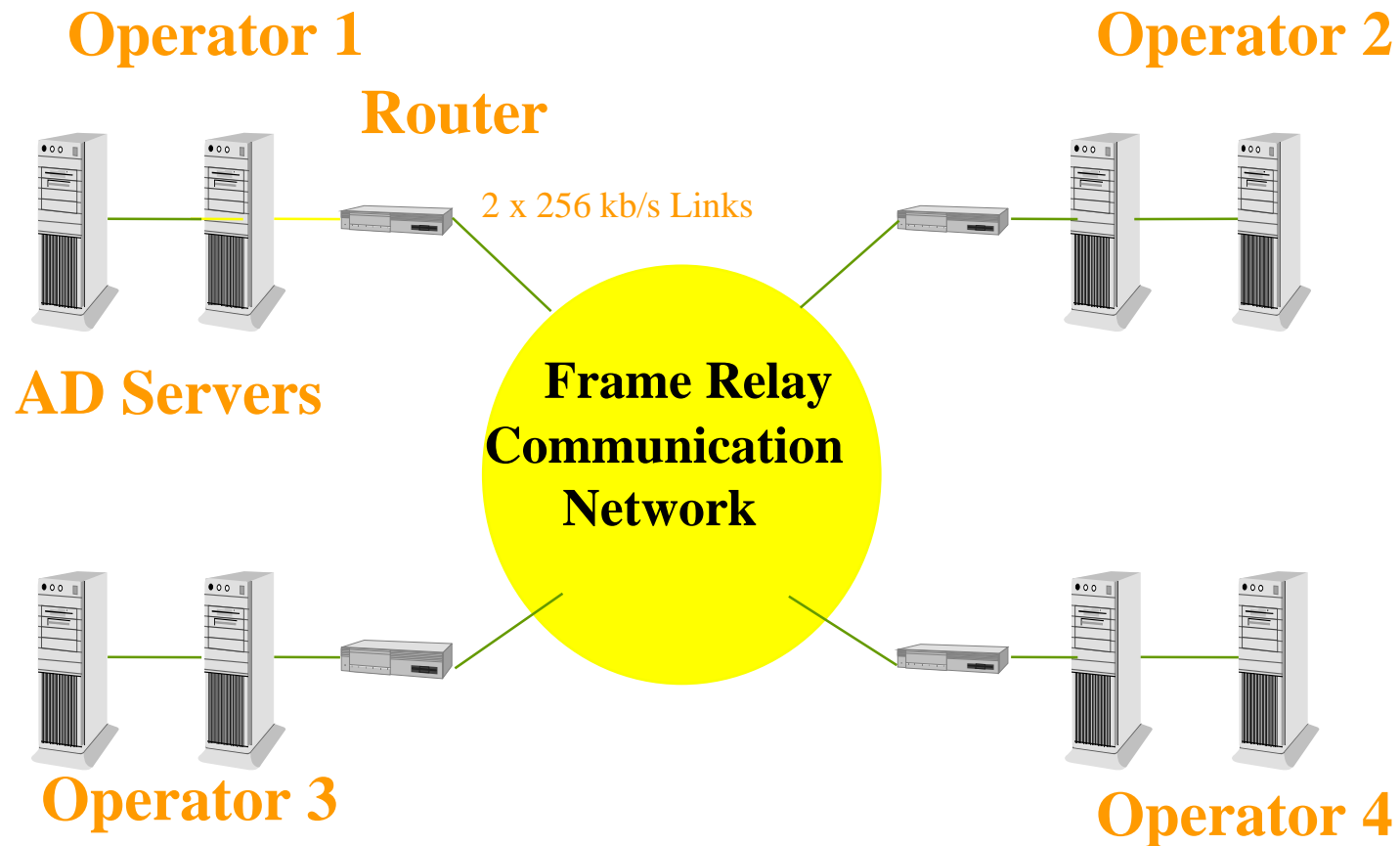
- ◆ store and exchange information among operators
- ◆ upload the received information to online GN database system during the cut-over period
- ◆ facilitate regular auditing
- ◆ serve as a backup image for disaster recovery

OFTA



電訊管理局

Mobile Number Portability



AD Communication Network

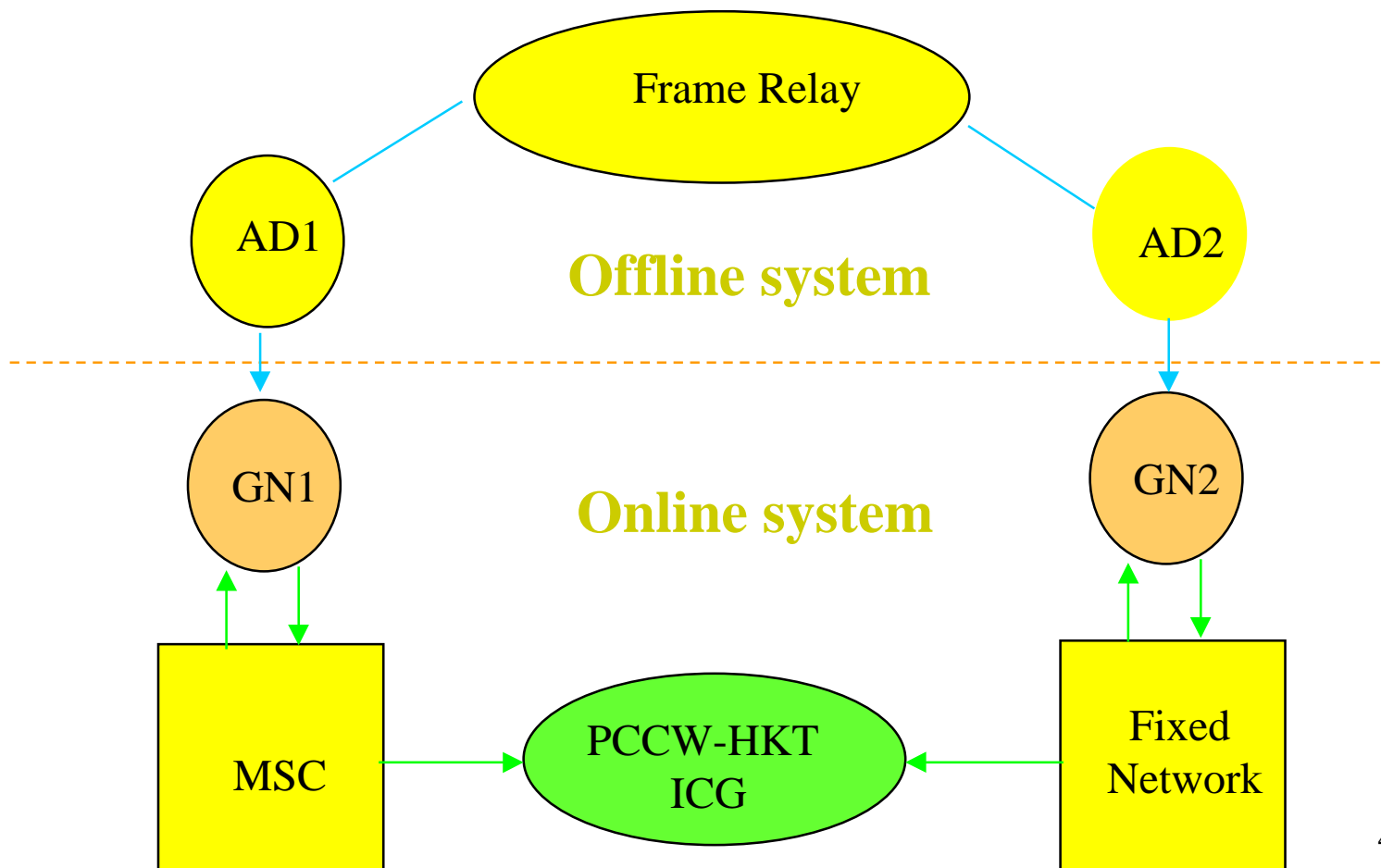
Mobile Number Portability

AD Information Exchange

- Sending network operator writes the information exchange files on a specific directory on its AD Server
- Receiving network operator uses FTP to poll the files from the specific directory of other AD systems over the Frame Relay Network
- Read/write cycle based on a 30-minute interval (first 15-minute write and the following 15-minute read)
- AD clock synchronization essential

Mobile Number Portability

Relationship Between AD and GN



Centralized Ticketing System

- allocates tickets to RNO on a first-come-first-served basis
- ensures daily quota for two cut-over sessions not exceeded (afternoon -2,000; mid-night -4,000)
- equips with 12 leased lines, 46 modem ports and 18 voice ports
- operated by a computer vendor
- all MNO/MVNO pay monthly service charge to this vendor

Mobile Number Portability

Daily Cutover Window

- Porting request received between 0900-1200 H on Day 1
 - earliest cutover is 1200-1400 H of Day 2
- Porting request received between 1200-1800 H of Day 1
 - earliest cutover is 0100-0400 H of Day 3
- During the cutover
 - AD data uploaded to GN systems
 - RNOs activate the service provision
 - DNOs delete the HLR record



電訊管理局

Mobile Number Portability

Cost Recovery Principles

- DNO cannot charge the customer for MNP services
- Database interrogation charge of PCCW-HKT (dominant FNO carrier) is regulated by the TA
- Per subscriber setup charge of PCCW-HKT is regulated by the TA

Mobile Number Portability

Database Interrogation Charge (Dipping Charge)

- charged at 0.5 cents (HK\$) per call attempt
- charged on successful and unsuccessful calls
- MNO/MVNO pays to the 4 FNOs for any calls originated from fixed networks to mobile networks
- Originating MNO/MVNO pays to FNO providing the look-up service for mobile to mobile calls
- MNOs/MVNOs are not entitled to receive the charge if they have their own GN database systems

OFTA



電訊管理局

Mobile Number Portability

Per Subscriber Setup Charge

- RNO pays HK\$2.5 to each FNO for database updating work for each porting (therefore in total HK\$10 / customer / porting)
- MNO/MVNO not entitled to receive the charge if they need to perform update of their own GN database systems
- Up to the RNO whether or not to charge the porting customers for porting

Mobile Number Portability

Procedures for Handling Porting

- Customer to fill the MNP Application Form
- RNO sends the required information including customer ID and mobile DN to DNO via the AD communication network
- DNO checks and acknowledges the porting
- RNO sends out Advice for Number Porting (APN) to all AD operators
- AD operators prepare the required information and upload to GN systems during the cut-over
- RNO informs all AD operators of successful porting after cut-over

Mobile Number Portability

Mobile Numbers to be Ported

- Mobile voice number
- Mobile fax/data number
- Voice/fax mailbox number
- Short Message Service (SMS) number
- Pre-paid SIM number

Results of Number Portability

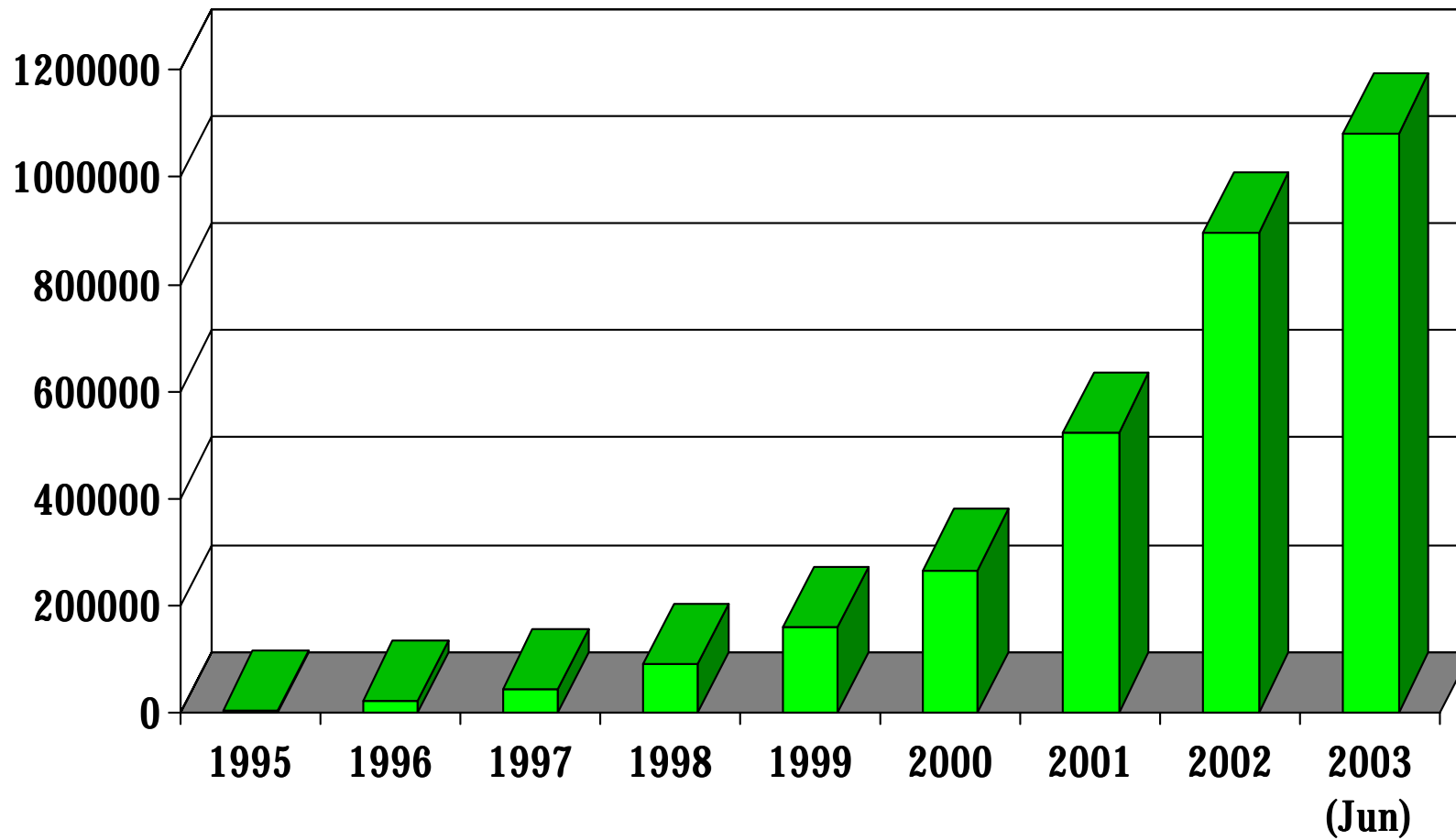
OFTA



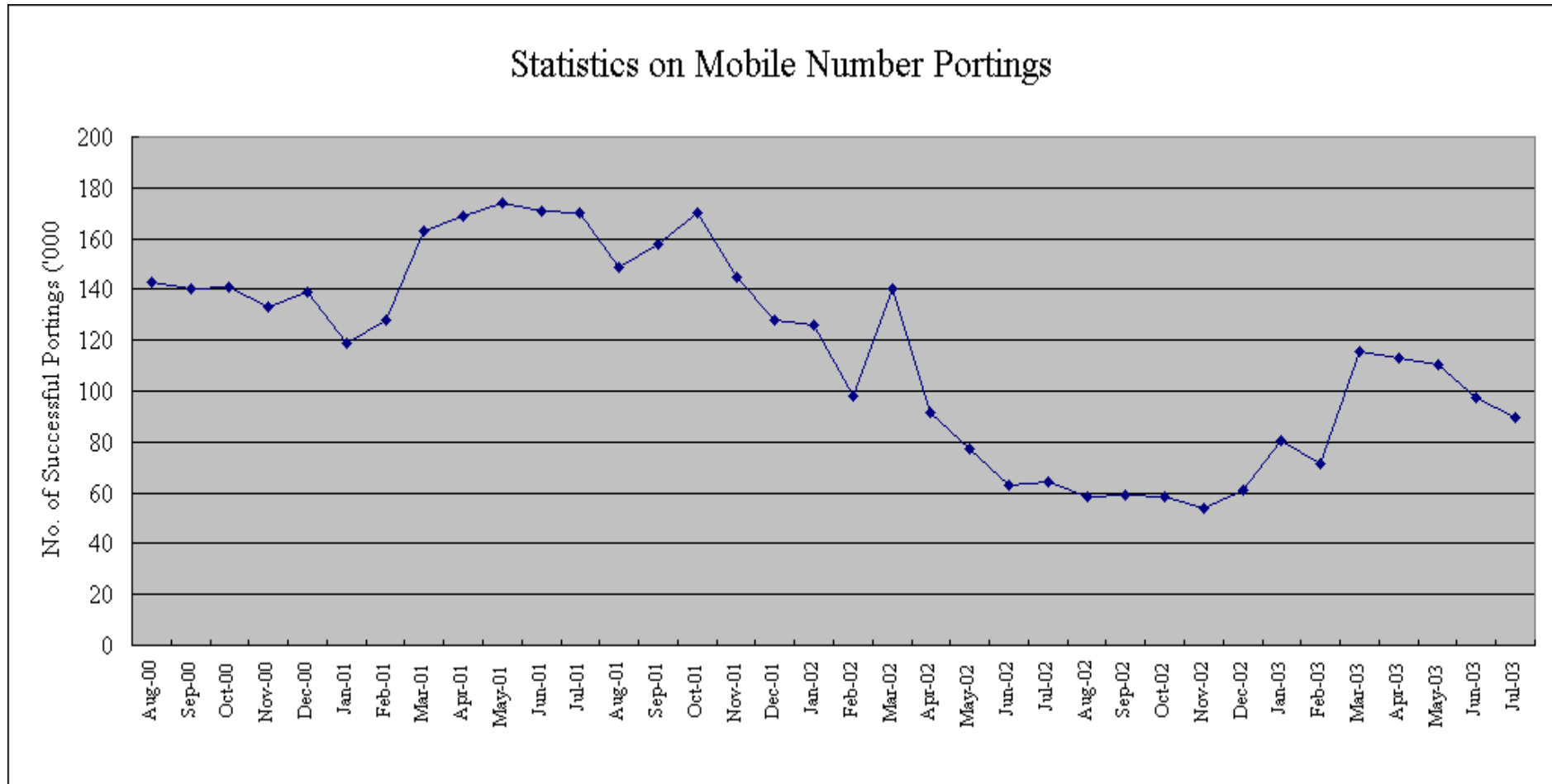
電訊管理局

Fixed Number Portability

Accumulative No. of Ported Numbers



Mobile Number Portability



Our Experiences

- Special packages (e.g. lower service charges, bundle with free VAS)
- stimulate sudden huge demand of MNP from customers
- Demand for MNP exceeds capacity of CTS
⇒ long waiting time previously

Our Experiences

- Operators followed the procedures laid down in Code of Practice issued by the TA
- Industry Task Force (ITF) holds regular meetings
- Problems brought up to ITF for discussion/resolution

Our Experiences

- Temporarily increase CTS capacity for MNP
- Measures to ensure proper use of reservation
- Introduction of administration cost for MNP and charge for SIM card - may be the reason for shortening the waiting time

Our Experiences

- Transparent charging principles
- Establishment of Guidelines and Procedures for Number Portability
- Streamline the procedures
- Publicity on the procedures for porting

OFTA



電訊管理局

FNP/MNP for New Services

- Mandate MNP for 3G and MVNO operators
- Mandate both FNP and MNP for new FTNS operators
- Complexity in maintaining the database systems increase with new operators (new FTNS, MVNO etc), especially AD systems
- Encourage new operators to share AD facilities with other existing operators as far as possible.

OFTA



電訊管理局

References

- TA's Statement: "Operator Number Portability: Recovery of Costs under the Intelligent Network Approach" dated 13 September 1997
- TA's Statement on "Number Portability for Public Mobile Services in Hong Kong: Cost Recover Framework" dated 28 Aug 1998
- Code of Practice related to Implementation of Mobile Number Portability dated 12 July 2000 (Issue 3)
- HKTA 2102 (Issue 3) -- Requirements for Number Portability by Database Solution
- HKTA 2103 -- Requirements for Mobile Number Portability by Database Solution (Issue 3)

The End
Thank You