“Open Network” Requirement for Third-Generation (3G) Public Mobile Radio Services in Hong Kong

Industry Workshop

5 January 2001

OFTA
電訊管理局

Presentations by Government

- Regulatory Framework
  - OFTA
- Measurement and Enforcement
  - Quotient Communications Limited, Consultant to OFTA for 3G Regulatory Framework

OFTA
電訊管理局

Regulatory Framework

OFTA
電訊管理局

Contents

- Background of “Open Network” requirement
- “Open Network” Requirement further defined

OFTA
電訊管理局

“Hybrid” Approach for Selection of 3G Licensees

- Pre-qualification
- Spectrum auctioning
- “Open Network” requirement

Objectives of "Open Network" Requirement

- To introduce more competition at the content and service application level
- To enable small and medium sized service or content providers to provide more innovative services in the market
- Existing 2G network operators may continue in 3G market even if they fail to obtain 3G network licences

OFTA
電訊管理局

“Open Network” Requirement

- Mobile Network Operators (MNO) to open up their networks to 3G service providers
- 3G service providers may include simple resellers and “Mobile Virtual Network Operators (MVNO)”
- MNO may be service providers or provide capacity to affiliated service providers

OFTA
電訊管理局

“Open Network” Requirement (Continued)

- MNO must open a defined percentage (called the Open Network Percentage) of the network capacity to non-affiliated service providers (NSP)
- Open Network Percentage may be 30% to 50% to be decided by the TA

OFTA
電訊管理局

Responses from Industry

- Should “Open Network” requirement be left entirely to commercial negotiations?
- How to define and enforce the “Open Network” requirement?

Regulatory Framework

- TA's preference is for MNO and service providers to work out and agree commercially the "Open Network" requirement
- Regulation - only a reserve mechanism
- Regulation necessary to ensure "Open Network" requirement is implemented and within reasonable timeframe.

OFTA
電訊管理局

“Open Network” Requirement Defined

- Not compelling MNO to leave network capacity idling, waiting for NSP demand
- MNO may use its network capacity, but obliged to supply capacity to NSP up to Open Network Percentage within a reasonable period
- When network capacity is expanded, so is capacity open to NSP

“Open Network” Requirement Defined

- Before the “Actual NSP Traffic Occupancy Percentage” reaches the “Open Network Percentage”
  - when new NSP asks for capacity, MNO must supply it
  - when NSP already connected ask for additional capacity, MNO must supply it

OFTA 電訊管理局

“Open Network” Requirement Defined

- After the “Actual NSP Traffic Occupancy Percentage” has reached the “Open Network Percentage”
  - MNO no longer has obligation to supply capacity to new NSP or additional capacity to NSP already connected
  - MNO may commercially decide to supply more capacity to MNO beyond Open Network Percentage

OFTA 電訊管理局

Non-Discriminatory Treatment of Traffic

- Traffic of MNO's own customers, affiliated service providers and NSP to be treated in a non-discriminatory manner
- Traffic from all sources to have (statistically) non-discriminatory quality of service (equivalent classes of traffic to receive equivalent treatment)

Wholesale Price

- Regulatory intervention only if commercial negotiations fail
- Two options being considered
  - "Cost plus"
  - "Retail minus"
- Current thinking of TA - "Retail minus" favoured in an undistorted market

Commitment of NSP

- NSP expected to enter into contracts with MNO
- NSP expected to enter into certain commitments on traffic volume
- Service providers subject to licensing
  - MVNO - PNETS licences
  - Resellers and content providers without facilities - class licences

Measurements and Enforcement

OFTA
電訊管理局

Contents

- The measurement method
  - Objectives of the measurement process
  - Dimensions of measurement
  - Steps in the measurement process
- NSP types
  - What defines an NSP?
  - Examples of NSP types

OFTA
電訊管理局

Objectives of the Measurement Process

- To provide evidence to support OFTA when regulatory intervention is required
- To ascertain whether a MNO meets the 'Open Network' requirements
- Requires measurement of:
  - Actual NSP Traffic Occupancy Percentage
  - To allow comparison with the Open Network Percentage

OFTA
電訊管理局

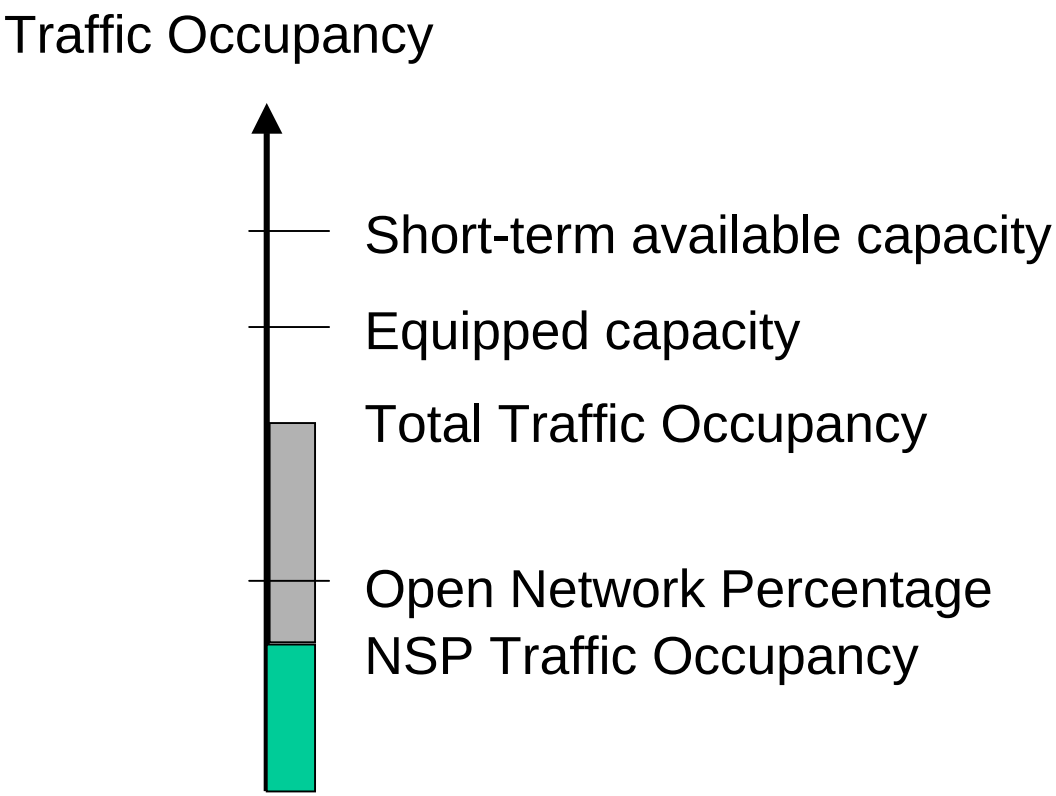
Measurement Method

- Four basic approaches to measurement
  - No measurement
    - Unlimited mandatory access for NSPs
  - Representing ‘Open Network’ Percentage as:
    - Percentage of actual usage
    - Percentage of actual capacity
    - Percentage of short term capacity

Objectives of the Measurement Method

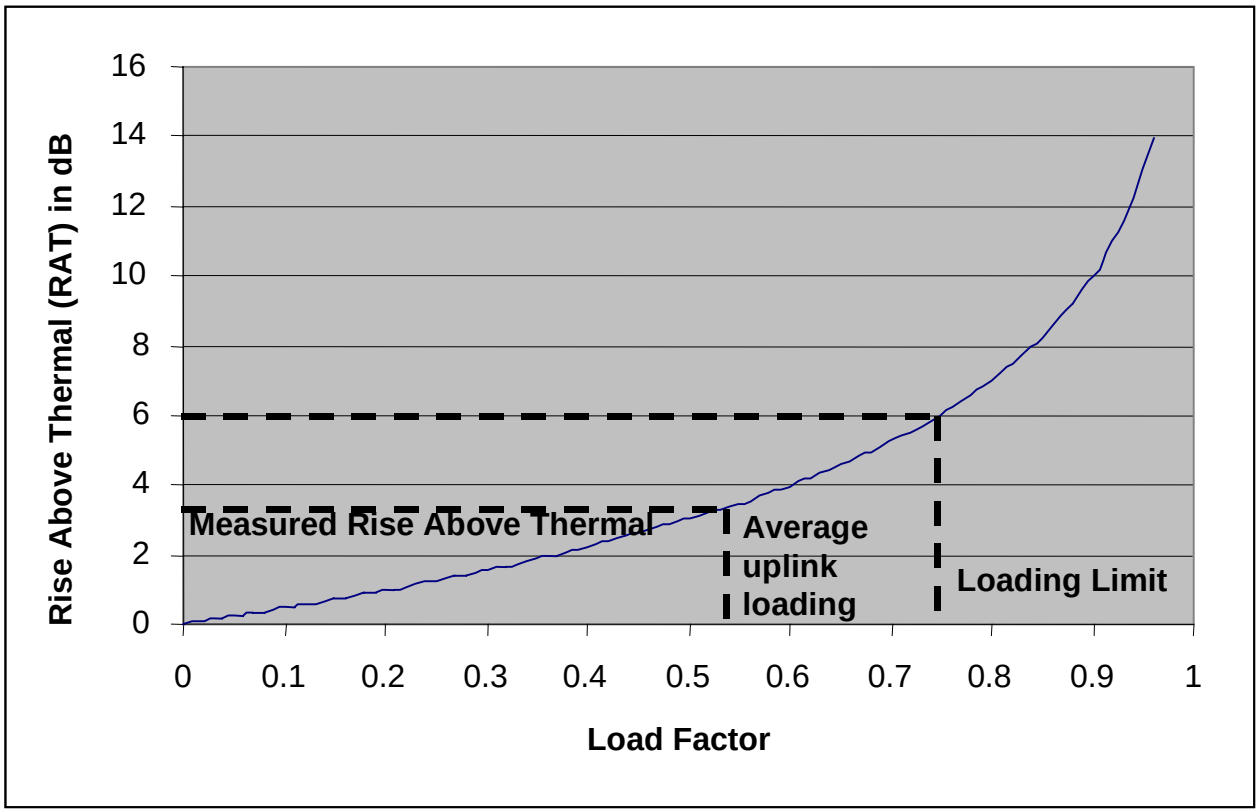
- Adequate within the spirit of ‘Open Network’ provision
- Intervention by OFTA only when required
- Measurable
- Non-ambiguous
- Auditable
- Easy to implement
- Cost effective
- Requiring little or no additional network expenditure
- Simple to enforce

Definition of Terms



OFTA
電訊管理局

Network Load



Uplink Loading = Load Factor (corresponding to RAT)

OFTA 電訊管理局

Measurement Area

- Options for area definition:
  - Entire 3G network
  - Areas served by specific network elements (e.g. RNC)
  - Designated geographic boundary
  - Busiest 1% of Location Areas
  - Busiest 1% of cells in the 3G network

Measurement Area (continued)

- Issues:
  - Compliance with the spirit of the objectives
  - Tying calls to cells rather than geographic boundaries
  - Availability of parameters
  - Manageability of data volume
- Busiest n% of cells is preferred

Measurement Time

- Monthly reporting interval
- Potential for multiple busy hours
- Weekly time consistent busy hour
- Requires continuous averaging of network parameters and traffic carried
- The number of hours to be averaged over is still to be determined

Measurement Step (1)

- Establish the Loading Limit
  - Depends upon the service mix and response times
  - Loading Limit agreed as network understanding is developed
  - Natural part of MNO performance evaluation
  - Limit may change with time as service mix changes

Measurement Step (2)

- Determine the Actual NSP Traffic Occupancy
  - For both uplink and downlink directions
  - Based on user data volume
  - Circuit based calls converted to equivalent user data volume
  - Obtained from Call Detail Records (CDRs) in the Measurement Area and Measurement Time
  - Requires CDR to contain Cell ID
  - Remaining issues:
    - Resolution of calls spanning edges of the busy hour
    - Rate adaptation

Measurement Step (3)

- Determine the Total Traffic Occupancy
  - For both uplink and downlink directions
  - Based on CDRs for:
    - NSP traffic
    - MNO traffic
    - Affiliated service provider traffic

Measurement Step (4)

- Determine Average Uplink Loading
  - The Uplink Loading is determined for each cell
    - Relies on RAT values being accessible
    - Instantaneous RAT is likely to be used in Call Admission Control algorithms
    - Average RAT is likely to be a fundamental parameter used to define network capacity requirements
  - Each carrier is considered as a separate cell
  - Uplink Loading is averaged over all cells in the Measurement Area over the Measurement Time

Measurement Step (5)

- Calculate Load Multiplier:

$$\text{Load Multiplier} = \frac{\text{Loading Limit}}{\text{Average Uplink Loading}}$$

- Alternatively:

Load Multiplier = Average of Load Multipliers calculated for each cell

Measurement Step (6)

- Calculate Uplink Available Capacity

Uplink Available Capacity (short-term)

= Uplink Total Occupancy * Load Multiplier

Measurement Step (7)

- Estimate Downlink Available Capacity
  - assumes uplink and downlink capacity is equal
  - scaling parameter could be included if necessary

Downlink Available Capacity (short-term)

$$= \text{Uplink Available Capacity} * \frac{\text{Downlink Total Occupancy}}{\text{Uplink Total Occupancy}}$$

OFTA 電訊管理局

Measurement Step (8)

- Calculate Uplink Actual NSP Traffic Occupancy Percentage

Uplink Actual NSP Traffic Occupancy Percentage =

$$\frac{\text{Uplink Actual NSP Occupancy}}{\text{Uplink Available Capacity}} * 100\%$$

OFTA
電訊管理局

Measurement Step (9)

- Calculate Downlink Actual NSP Traffic Occupancy Percentage

Downlink Actual NSP Traffic Occupancy Percentage =

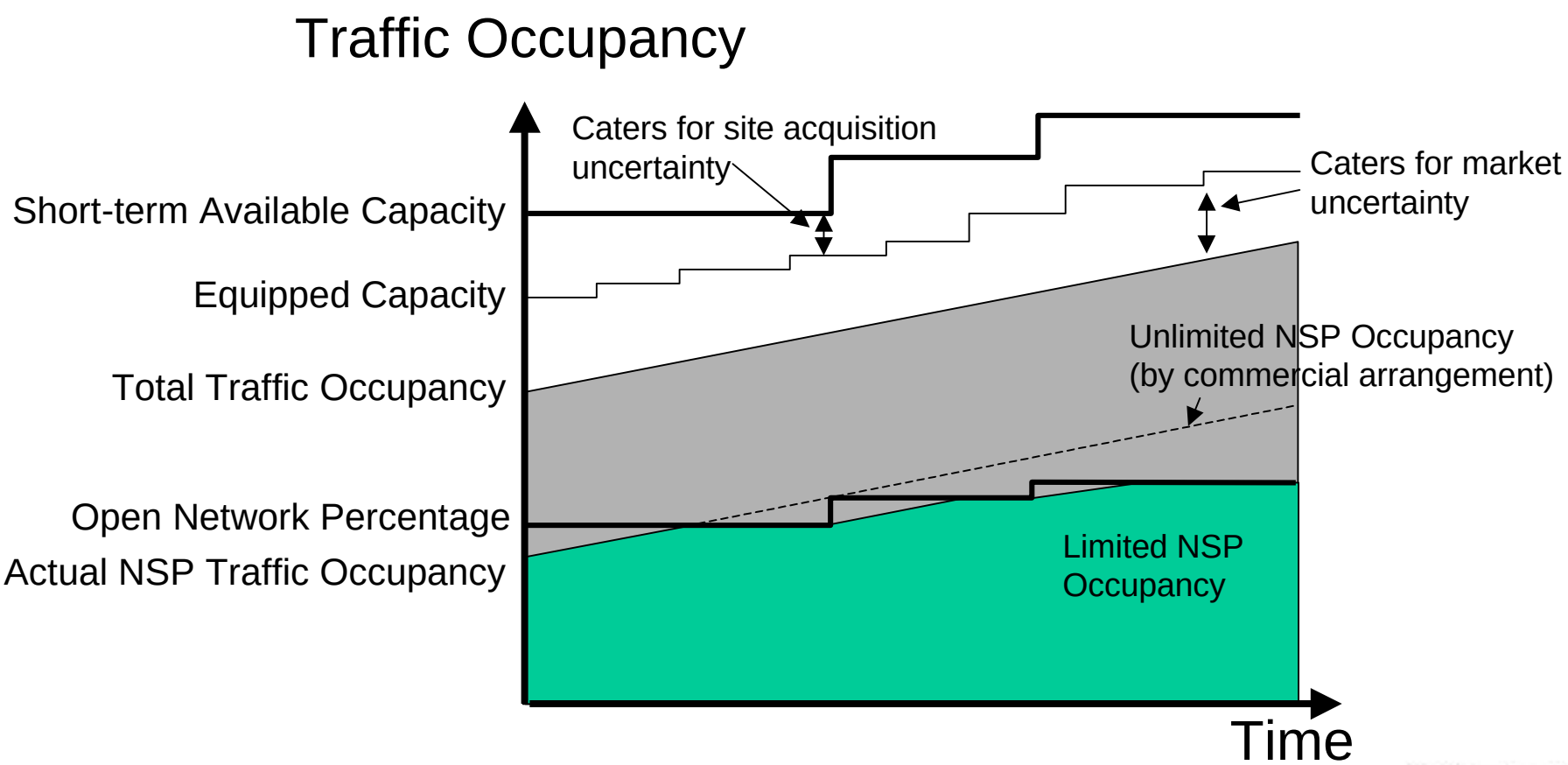
$$\frac{\text{Downlink Actual NSP Occupancy}}{\text{Downlink Available Capacity}} * 100\%$$

OFTA 電訊管理局

Measurement Step (10)

- Determine the Actual NSP Traffic Occupancy Percentage
  - Maximum of the Uplink or Downlink Actual NSP Traffic Occupancy Percentages

Practical Implementation

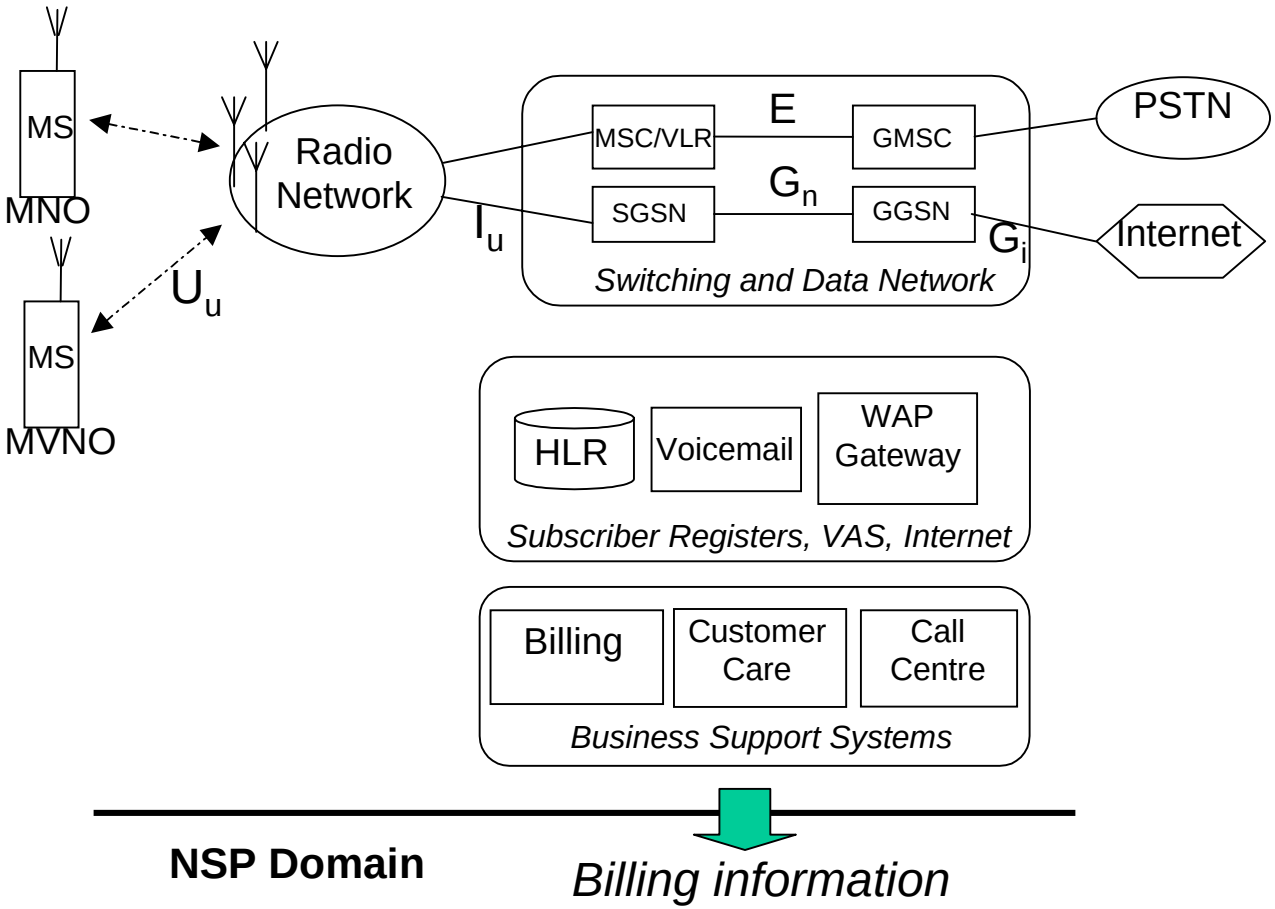


OFTA 電訊管理局

NSP Types

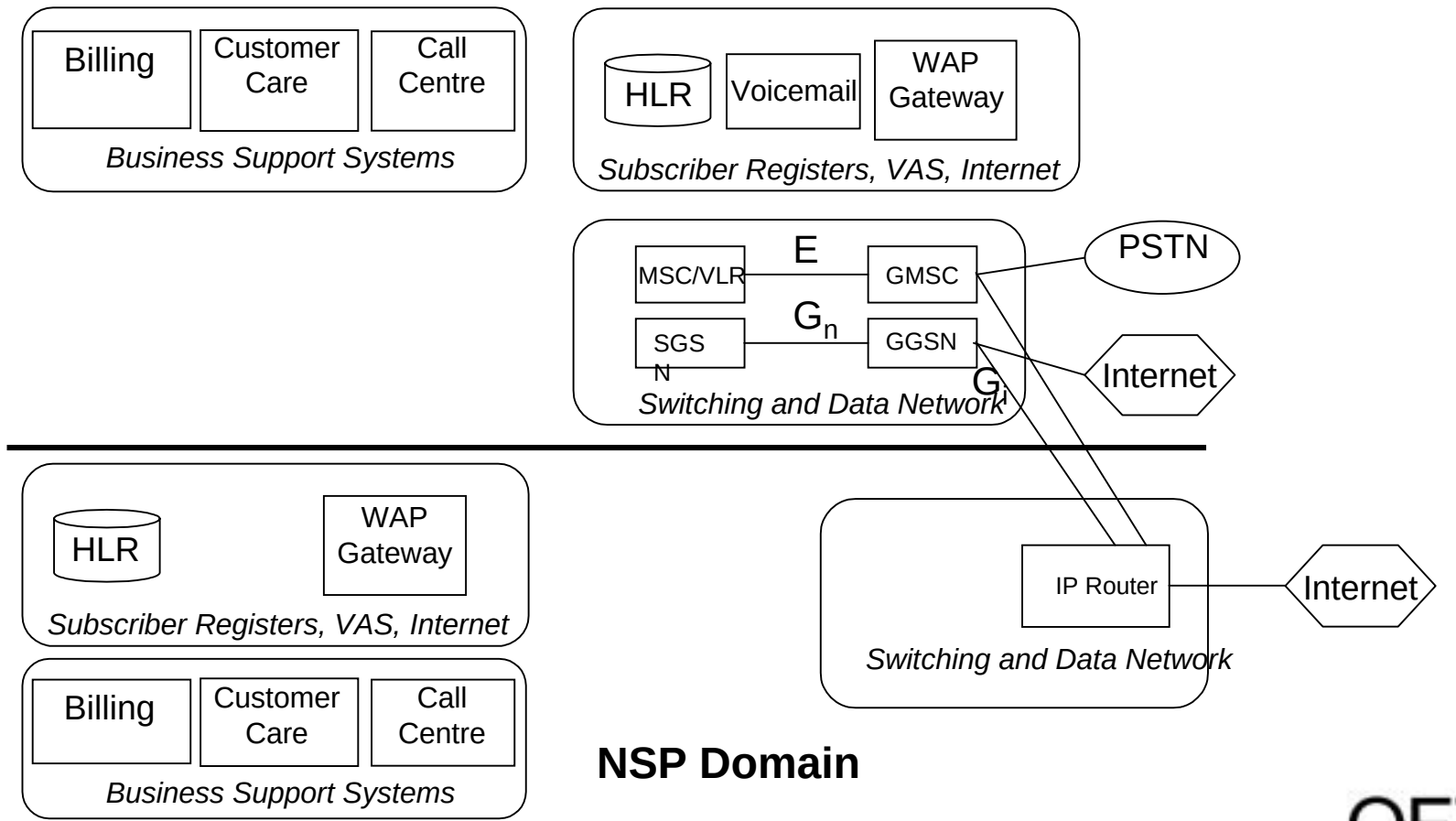
- What defines a NSP?
  - Subscriber ownership
  - Mobile Network Code (MNC)
  - Traffic routing flexibility
  - Location information
  - Access to other VAS platforms

Example NSP Types (1) Service Provider



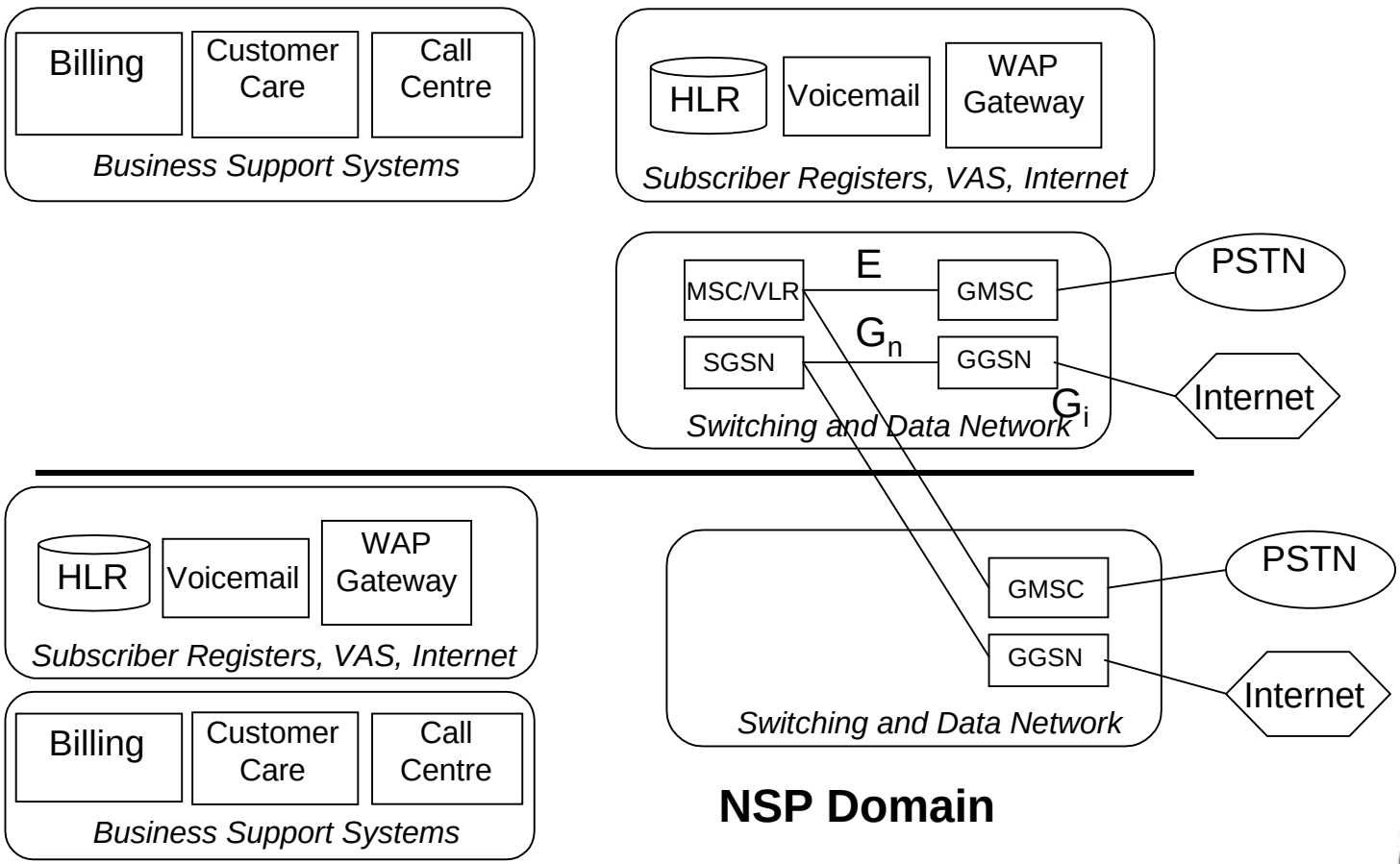
OFTA 電訊管理局

Example NSP Types (2) Enhanced Service Provider



OFTA 電訊管理局

Example NSP Types (3)
Full MVNO



OFTA 電訊管理局

Summary of NSP Types

- Wide range of implementation types
- Measurement method applies to all
- Different regulatory and commercial conditions may be applied to reflect degrees of functionality

Office of the Telecommunications Authority

5 January 2001

OFTA
電訊管理局