

Game analysis: Roaming agreements

S-38.042

5.11.2003

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Contents

- What is roaming?
- Importance
- Roaming agreements
 - GSM
 - GPRS
- Roaming in MOB

What is roaming?

- Roaming – Ability to use one's device on foreign network
 - GSM, SMS, CS data, GPRS, MMS, 3G, WLAN, Broadband access, ...
- International roaming – Roaming between operators in different geographical area
 - 6 Billion roaming calls per year in GSM
 - 20000 roaming agreements, world-wide coverage
- National roaming – Roaming between operators in the same geographical area
 - Only few agreements in 2G world
 - Business and regulation aspects in 3G networks
- Inter-standard roaming
- Inter-technology roaming
 - 2G <-> 3G
 - Cellular <-> WLAN
 - Public <-> Private networks

Importance of roaming and interoperability

- Reed's law

$$\text{Total value} = c_1 \cdot N + c_2 \cdot N^2 + c_3 \cdot 2^N$$

(connecting + pairing + group forming)

N = number of customers

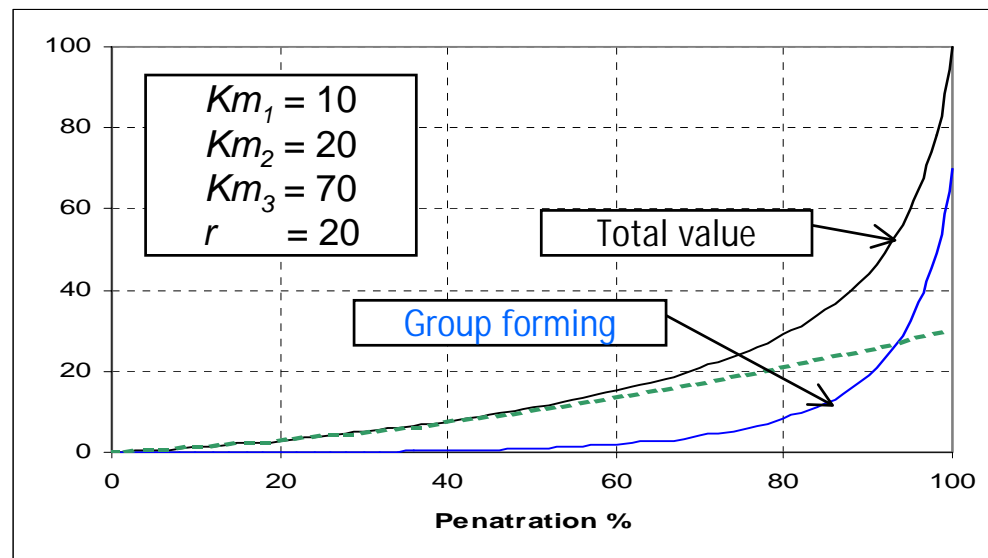
- KK (Kalervo-Kilkki) -law

$$\text{Total value} = K \cdot \{m_1 \cdot p + m_2 \cdot p^2 + (m_3 \cdot p^3)/(r-2 - (r-3)p)\}$$

(connecting + pairing + group forming)

K = total population

p = penetration



Importance of roaming and interoperability

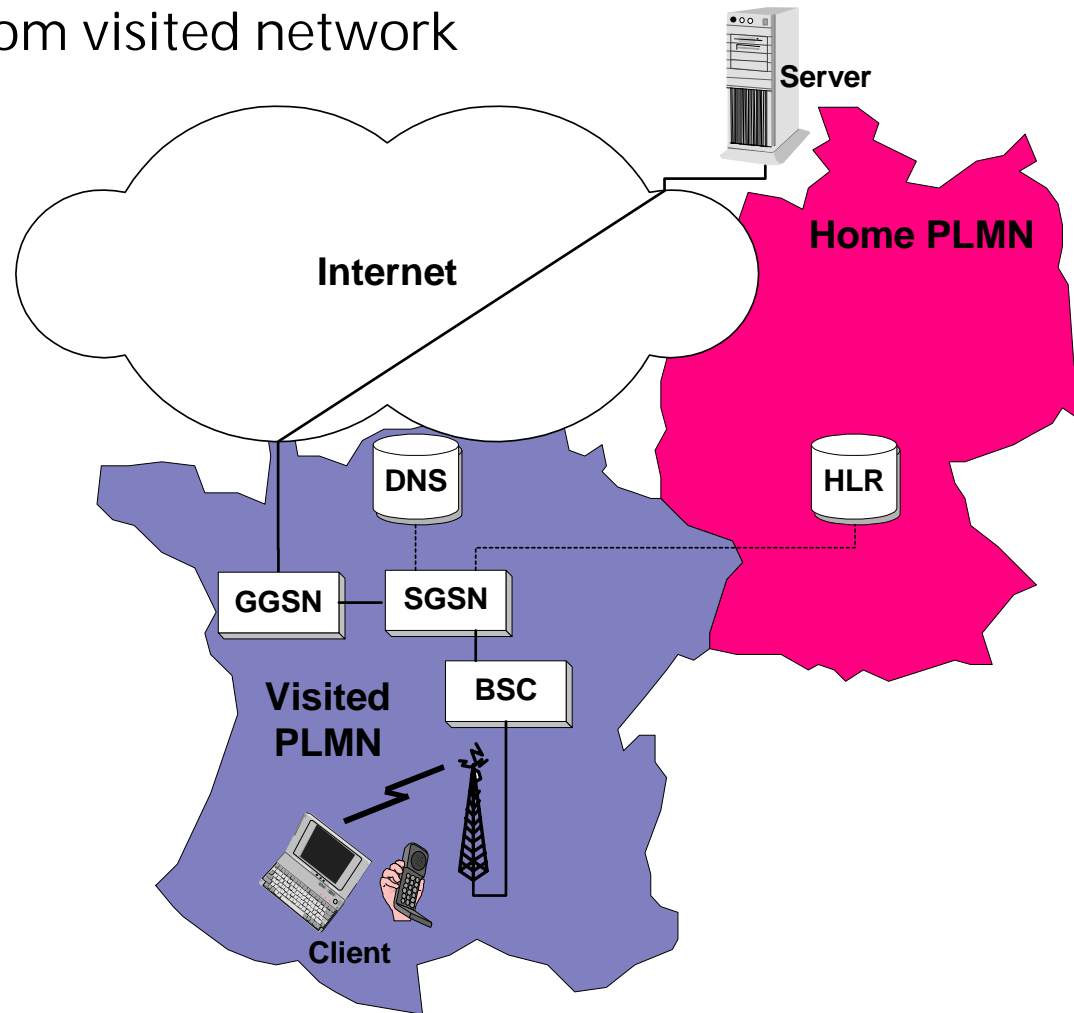
- Implications
 - Penetration rather than number of customers
 - Interoperability and roaming are the keys
 - Increases size of reachable population
- US SMS growth
 - 1Q 2002: 820 Million SMS's
 - 2Q 2002: 1,600 Million SMS's
 - Mainly due to agreements between operators
- Roaming brings significant revenues to operators

GSM roaming agreements

- Wholesale
 - Bilateral roaming agreements
 - SMS, CS data usually part of agreement
 - Inter Operator Tariff (IOT) to visited network
 - Roaming brokers/aggregators
 - Indirect agreement with several operators at once
 - Direct connections between operators
 - Billing and settlements through data clearing houses
- Regulation
 - Substantial rise in wholesale prices
 - Handling charges increased
 - EU commission expressed its concern

GPRS: ISP Roaming

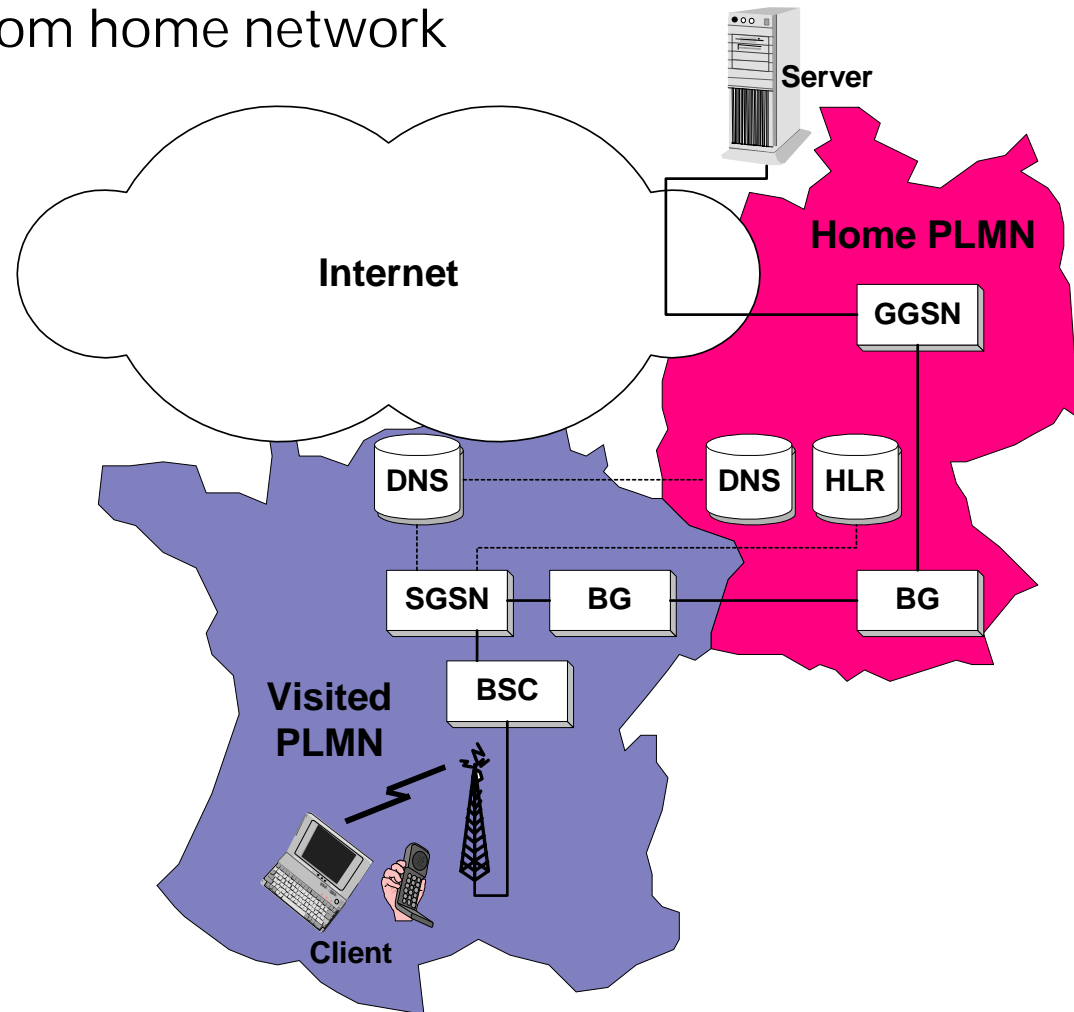
- Service from visited network



Source: Swisscom

GPRS: PLMN Roaming

- Service from home network



Source: Swisscom

PLMN Roaming: Direct connections

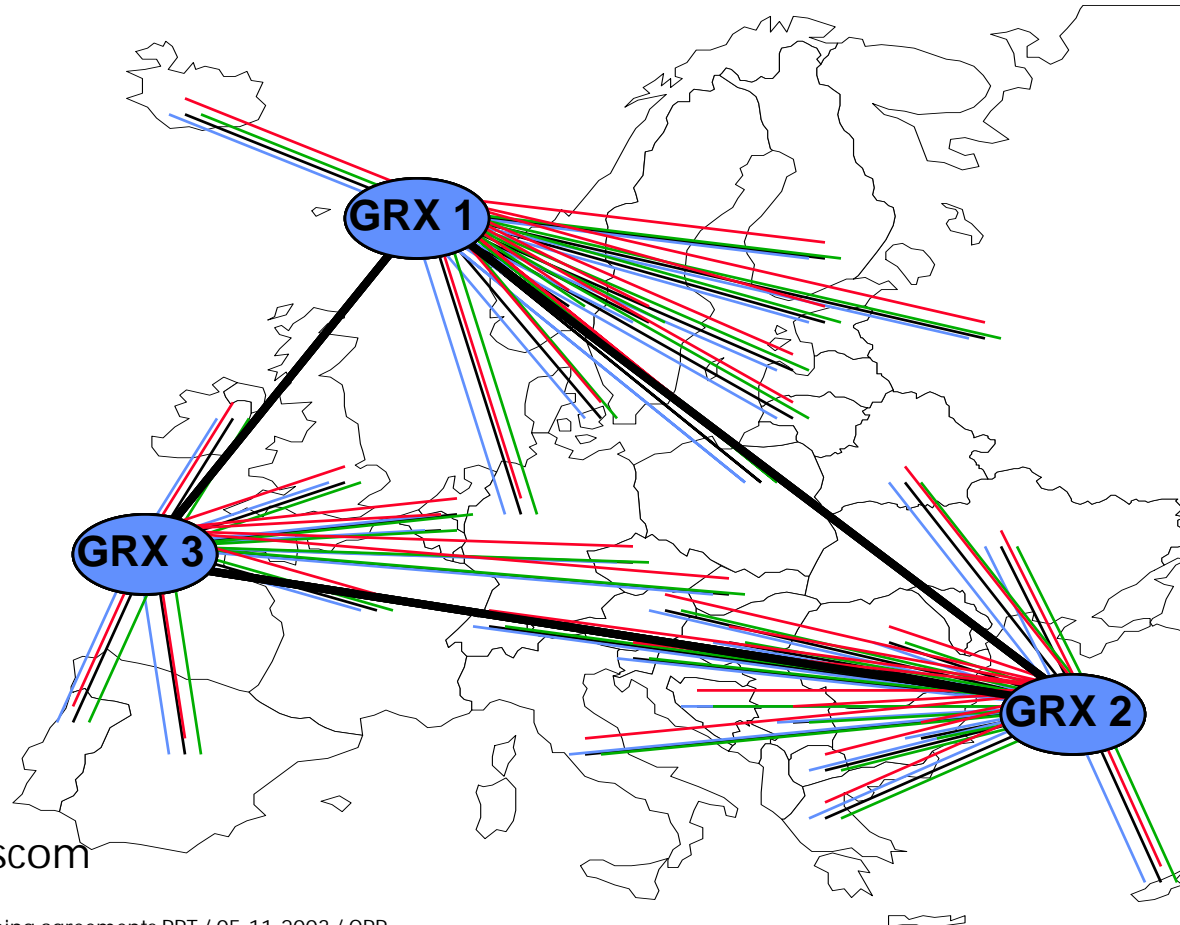
- Leased lines or VPNs between each operator



Source: Swisscom

GPRS Roaming eXchange

- Dedicated IP backbone network to connect GPRS networks
- Routes traffic from visited network to home network
- Mobility management, billing, service quality, security, DNS root



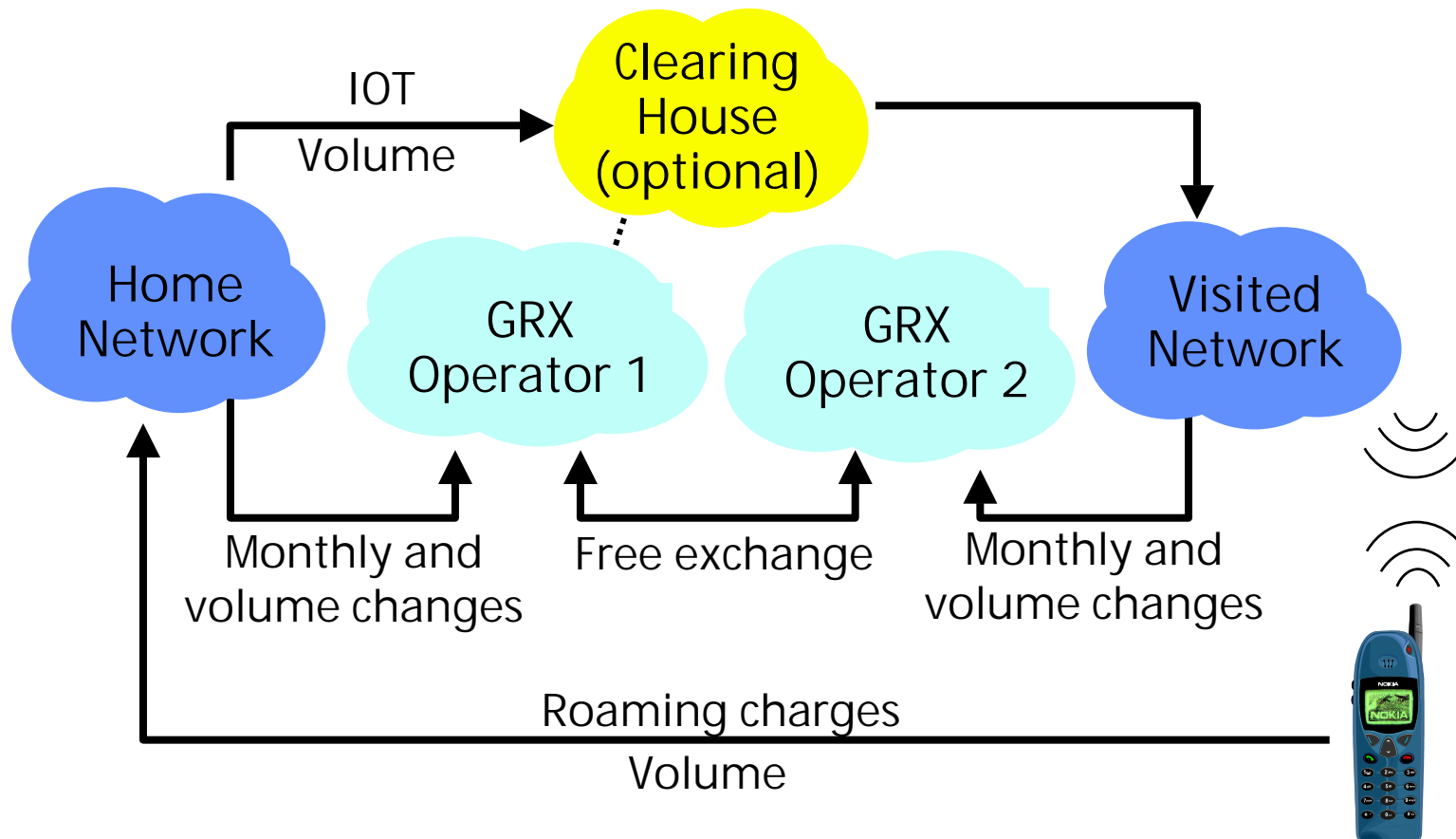
Source: Swisscom

GPRS roaming agreements

- Legal agreements
 - Mutual agreements between operators
 - Roaming brokers/aggregators (could be GRX)
- Traffic agreements
 - Sometimes direct connections with main partners
 - Typically agreement with one or two GRX operators
 - Direct GRX – GRX agreements
 - GRX – GRX peering agreements
- Billing through data clearing houses (could be GRX)
- GRX can be: global interconnection point, clearing house, roaming broker, offer IP and other services
- Content roaming agreements
 - Content providers
 - Content aggregators
 - Clearing houses

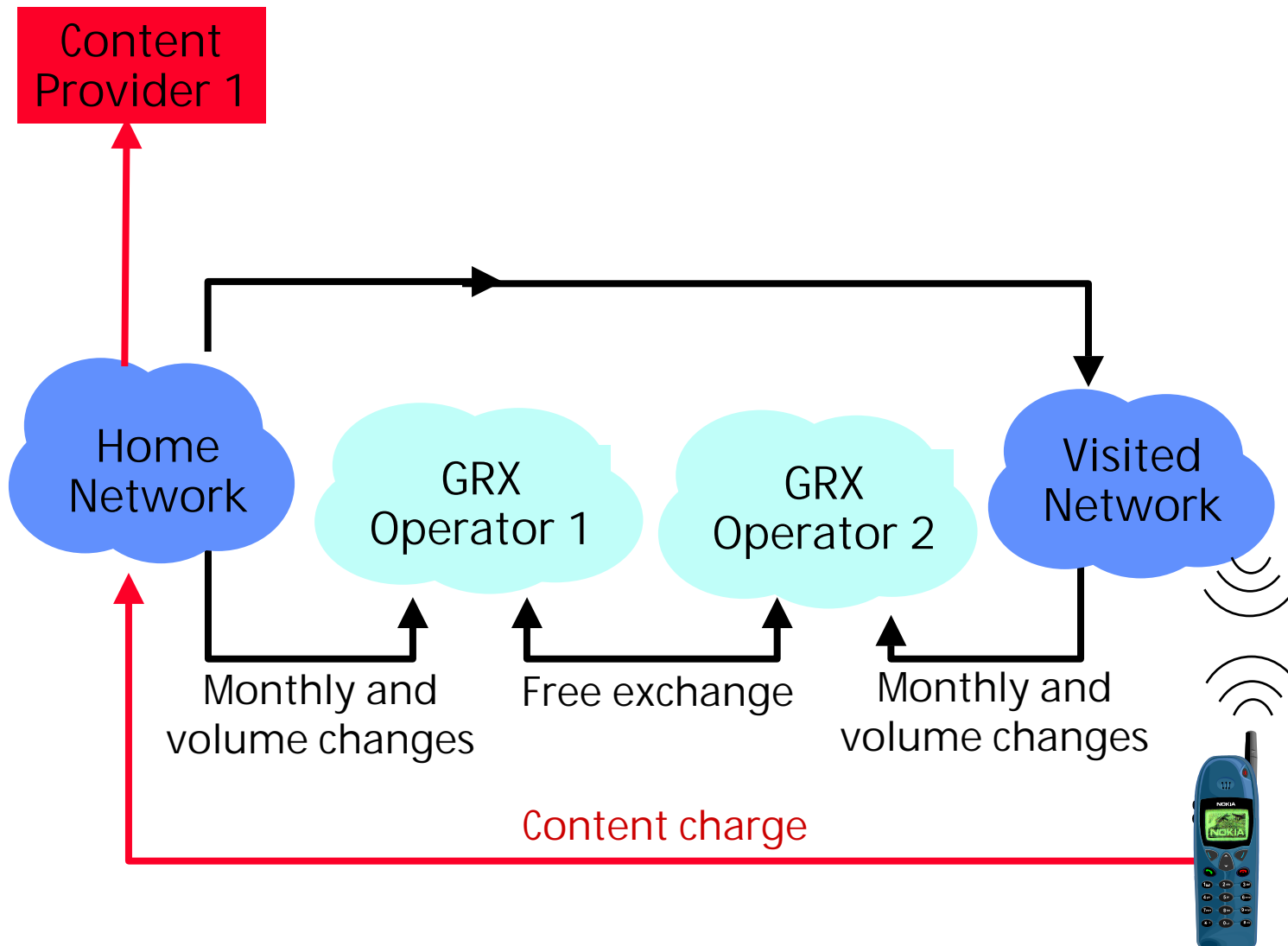
GPRS: Financial flows

Traffic



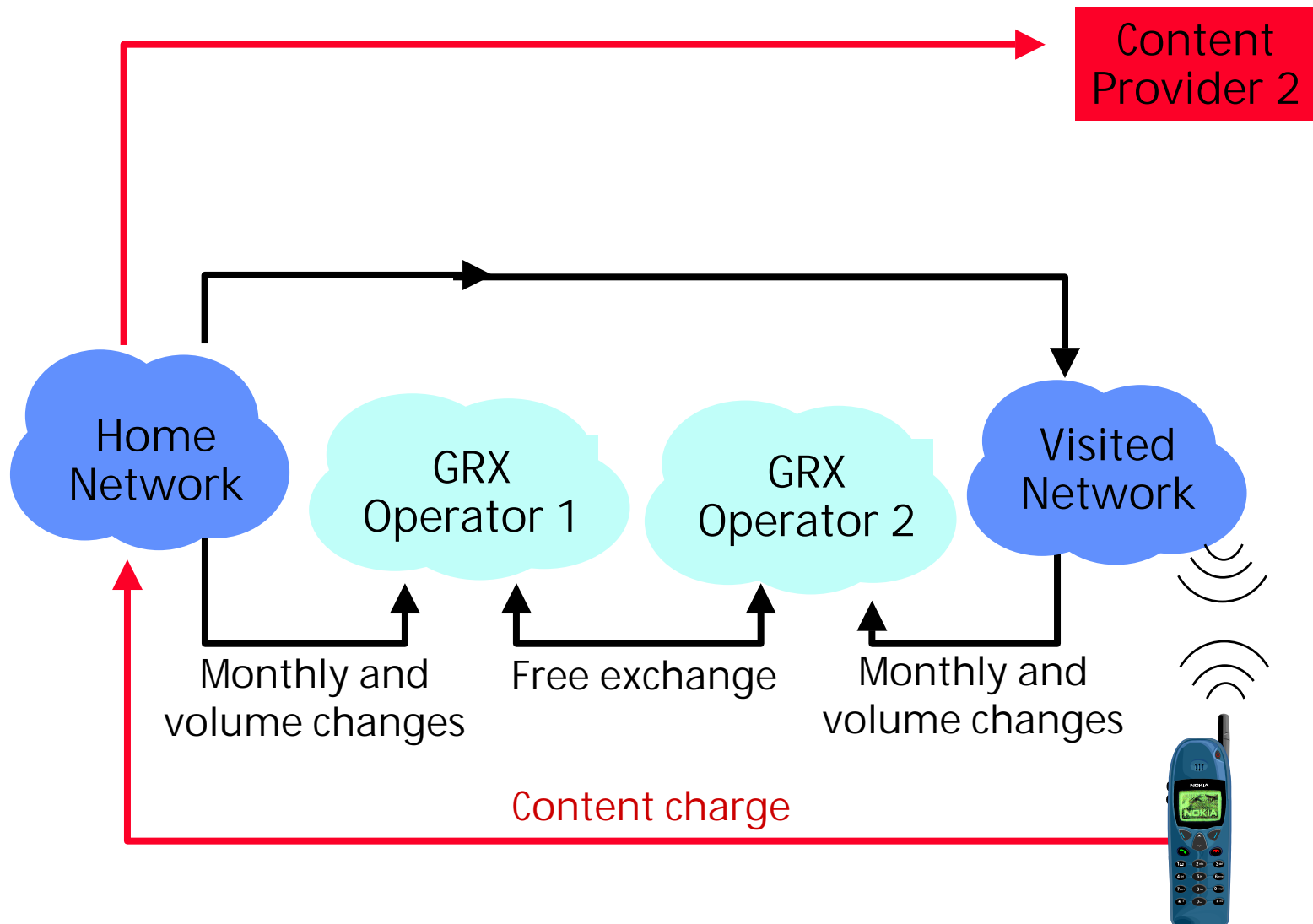
GPRS: Financial flows

Content



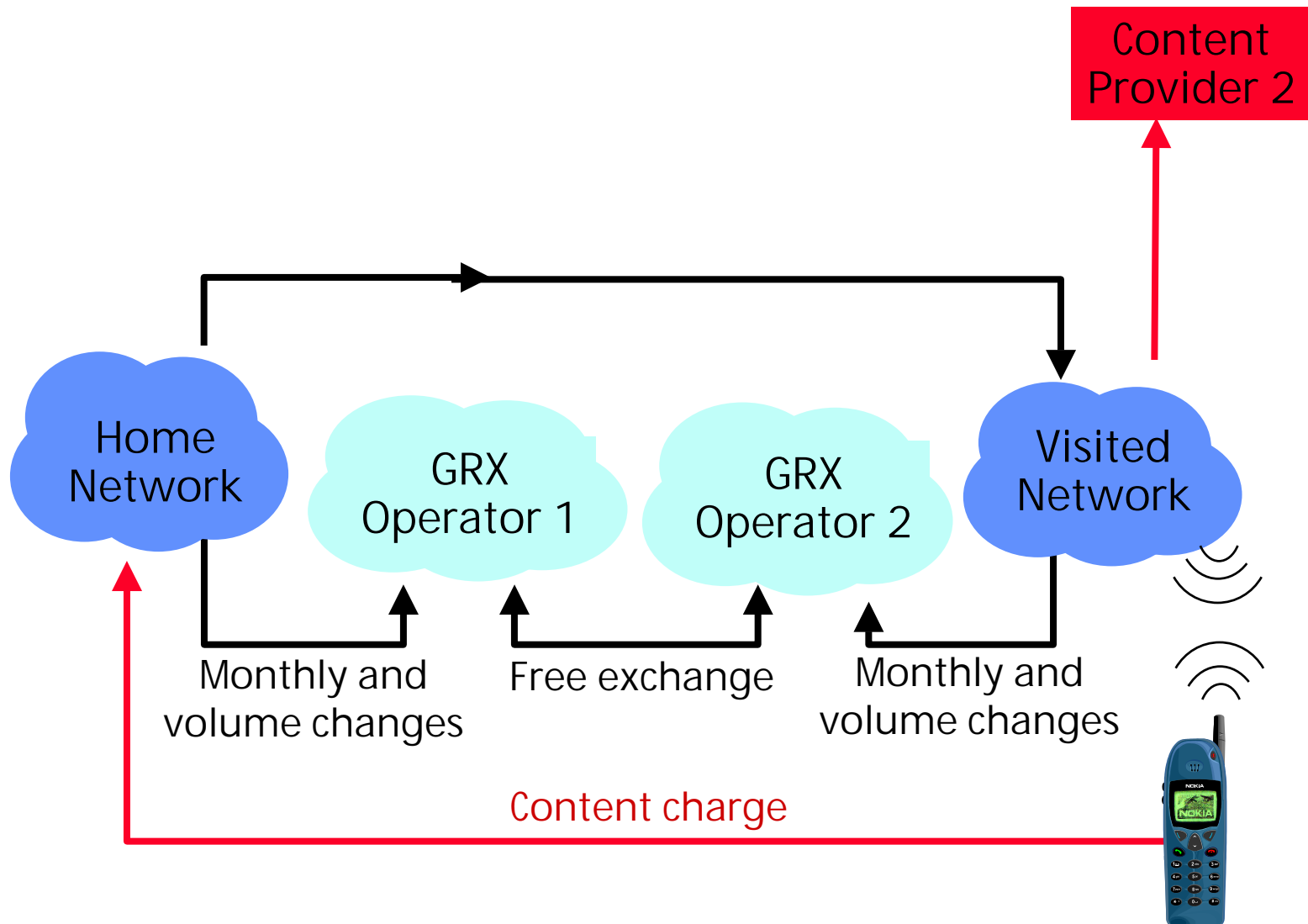
GPRS: Financial flows

Content



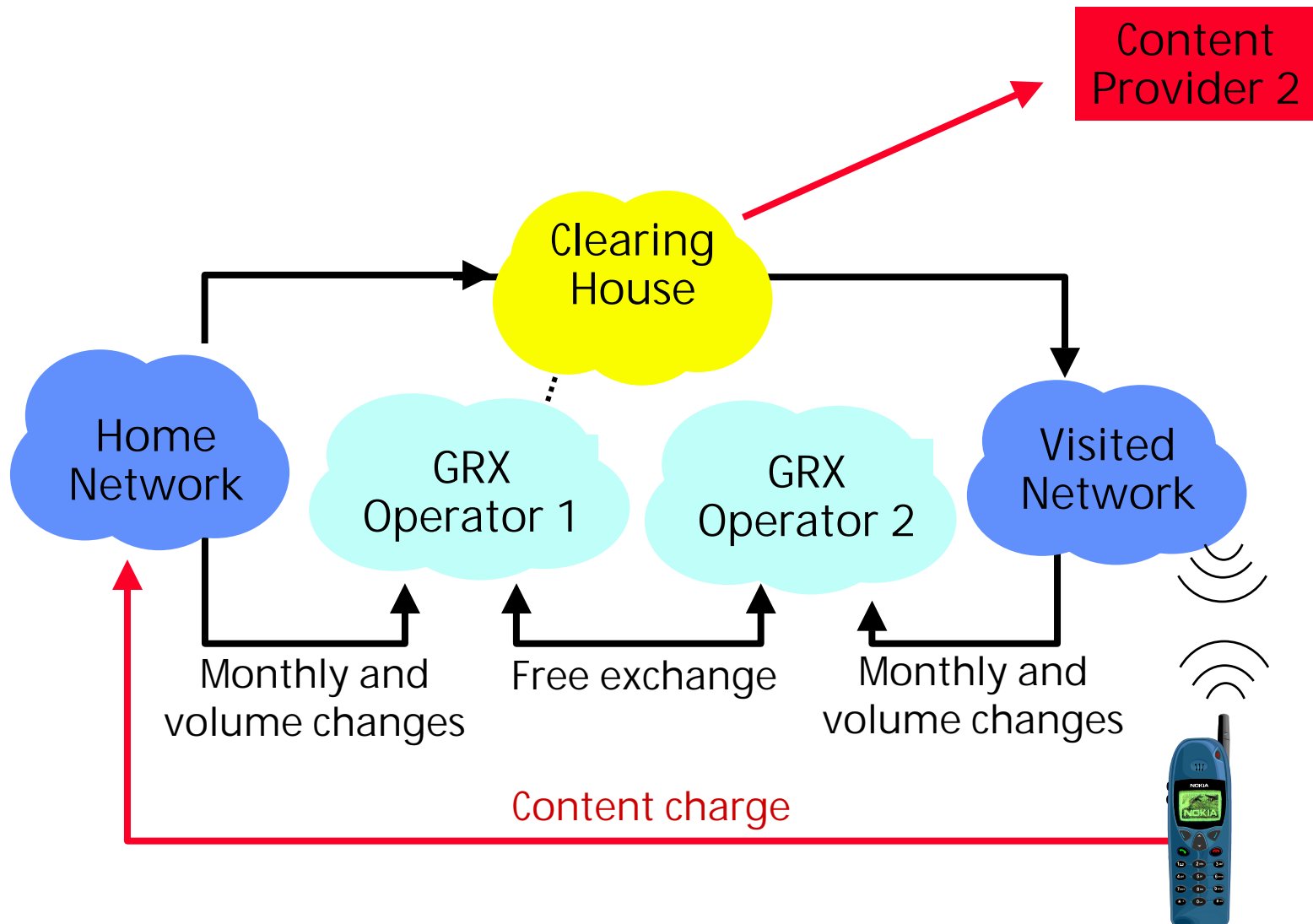
GPRS: Financial flows

Content



GPRS: Financial flows

Content



Key questions to operator

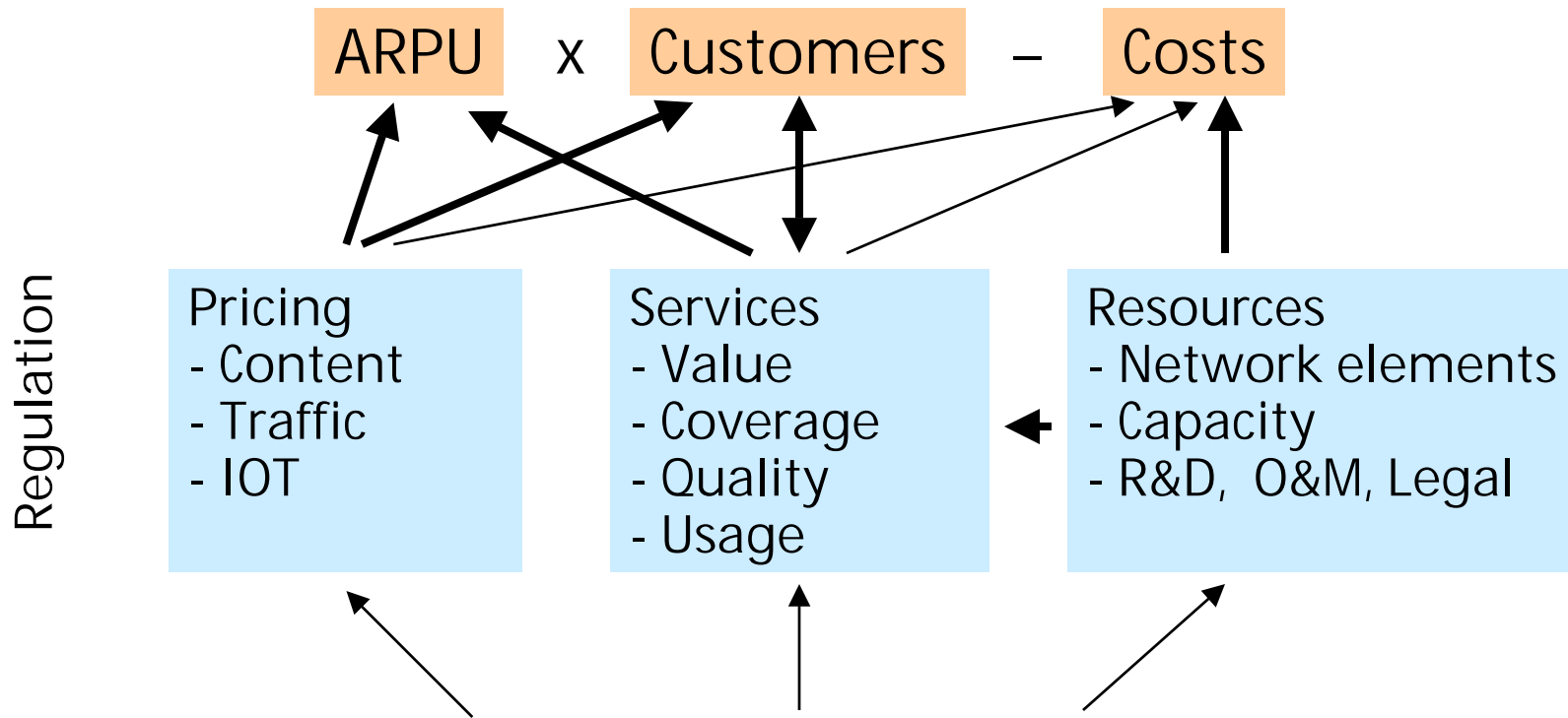
Own customers in visited network

- How to gain the most value to my customers?
- How to attract new customers?
- How to minimize the cost?

Visiting customers in my network

- How to get the maximum number of visiting customers?
- How to get the most money from them?
- How to minimize the cost?

Roaming decisions and dependences in MOB



- Roaming decisions (own customers, visiting customers)
- International roaming partners?
 - National roaming?
 - Cross technology roaming?
 - Content roaming?
 - Retail pricing?
 - Wholesale pricing?
 - Supported technologies and services?