Game analysis: Roaming agreements

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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
  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
  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

- Diagram showing total value and group forming with:
  - $Km_1 = 10$
  - $Km_2 = 20$
  - $Km_3 = 70$
  - $r = 20$
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

- Home Network
- GRX Operator 1
- GRX Operator 2
- Visited Network

IOT Volume

- Monthly and volume changes
- Free exchange
- Monthly and volume changes

Clearing House (optional)

Roaming charges Volume
GPRS: Financial flows

Content

Content Provider 1

Home Network

GRX Operator 1

Free exchange

GRX Operator 2

Visited Network

Monthly and volume changes

Monthly and volume changes

Content charge
GPRS: Financial flows

Content

- Home Network
- GRX Operator 1
- GRX Operator 2
- Visited Network

- Monthly and volume changes
- Free exchange
- Monthly and volume changes

Content charge

Content Provider 2
GPRS: Financial flows

Content

Home Network

GRX Operator 1

GRX Operator 2

Visited Network

Monthly and volume changes

Free exchange

Monthly and volume changes

Content charge

Content Provider 2
GPRS: Financial flows

Content

Clearing House

Home Network

GRX Operator 1

GRX Operator 2

Visited Network

Content charge

Monthly and volume changes

Free exchange

Monthly and volume changes

Content Provider 2
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

ARPU × Customers - Costs

Pricing
- Content
- Traffic
- IOT

Services
- Value
- Coverage
- Quality
- Usage

Resources
- Network elements
- Capacity
- R&D, O&M, Legal

Regulation

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