

Assessing different technical solutions for the separate sale of roaming services / “Unbundling”

Deutsche Telekom AG / T-Mobile Austria GmbH

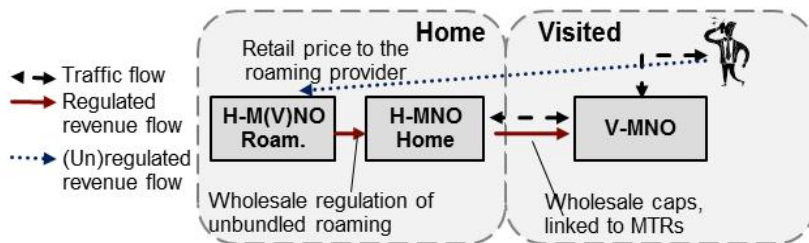
Meeting with RTR-GmbH

Vienna, 20 April 2012



“Single IMSI” implementing solution is customer friendly, cost efficient, seamless and secure

Description



- Alternative Roaming Provider closes a Wholesale (WS) contract with Home MNO to resell roaming services to end-customers under its own name and on its own account
- Customer has the flexibility to choose any alternative Roaming Provider who has WS contract with its Home MNO
- Customer keeps existing subscription with Home MNO for domestic services, un-subscribes existing roaming services and subscribes to roaming services of an alternative Roaming Provider
- Customer keeps same number
- Customer keeps all services – even those services which do require technical support from the Home MNO
- “Classic” technical roaming would not change

Implementation issues

- Alternative Roaming Provider offers retail roaming services while roaming traffic & control of SIM profile is managed by home operator

**Detailed
Assessment
see next page!**



Legend: H-MNO/MVNO – Home MNO/MVNO
V-MNO – Visited MNO
H-M(V)NO Roam. – Roaming M(V)NO/ alternative Roaming Provider

“Single IMSI” implementing solution: Assessment

- advantages clearly outweigh the disadvantages!

Benefits (“PROS”) of “Decoupling” - or “Single IMSI” - implementing solution

- Fulfills most of EU-Commission’s expectations – (esp. timeframe 2014)
- Realistic & proportional network implement. costs & complexity
- Customer experience like today’s roaming
 - Customer keeps same number; no change of handset and SIM
 - Customer keeps all services – even those services which do require technical support from the Home MNO – e.g. Blackberry, VPN, etc.
 - Transparency clause (management of financial/volume limits for outstanding charges for data roaming) fully supported by Home MNO

Disadvantages (“CONS”) of “Decoupling” - or “Single IMSI” - implementing solution

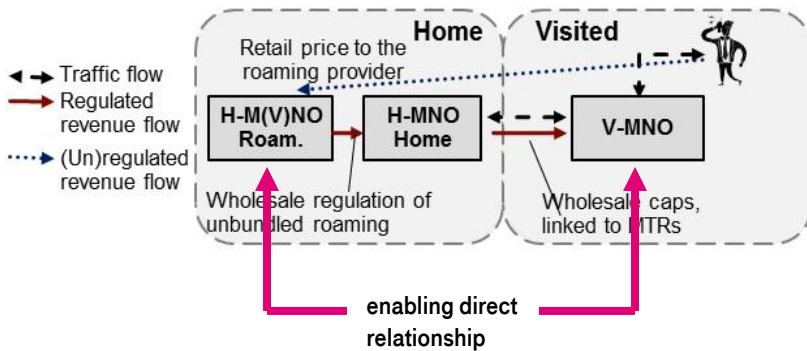
- As Decoupling is based on a Wholesale Model where Alternative Roaming Provider closes a wholesale contract with Home MNO (to resell roaming services) the Alternative Roaming Provider will not negotiate own wholesale contracts with other MNOs in Europe – on the other hand this model can be used by various players which do not need own Telco infrastructure (e.g.: airlines, tourism industry, etc.) and thereby promote competition



“Single IMSI +”

Extensions to potentially attract new alternative roaming provider

Description



- As one point of critique to the single IMSI approach has been, that an alternative roaming provider would have no possibility to grant own roaming agreements.
- Mainly two different extensions are currently subject for discussion.
 1. Extending signalling capabilities to directly identify customers of alternative roaming provider. Enabling direct charging relationship by modifying core network and TAP processes.
 2. Extending the post processing of charging data , enabling settlement of own discount agreements between V-MNO and alternative roaming provider

Implementation issues

- Alternative Roaming Provider offers retail roaming services while roaming traffic & control of SIM profile is managed by home operator

**Detailed
Assessment
see next page!**



Legend: H-MNO/MVNO – Home MNO/MVNO
V-MNO – Visited MNO
H-M(V)NO Roam. – Roaming M(V)NO/ alternative Roaming Provider

“Single IMSI +”

1. Extending signalling capabilities (Discussion abandoned)

see Decoupling slide

additional benefits and disadvantages:

Benefits

- Enable own wholesale contracts between alternative roaming provider and V-MNO

Disadvantages

- Substantial changes in technical implementation.
 - HLR, MSC, SMSC extensions. All networks have to implement or upgraded to Camel 2 signaling.
 - Current proposal is only valid for mobile originated circuit switched services. It is in conflicts with today's mobile terminating circuit switched services and does not support packet switched services.
 - Different solution for data services have to be defined.
 - Major changes in the TAP architecture necessary.
 - Standards have to be changed, implemented and tested.
 - Major time constraints, as well core network implementation and testing as TAP architecture changes, implementation and testing, will generate an extreme challenge to meet required time figures. May be will prohibit time figures.



“Single IMSI +”

2. Extending the post processing

see Decoupling slide

additional benefits and disadvantages:

Benefits

- Enable own discount agreements between alternative roaming provider and V-MNO

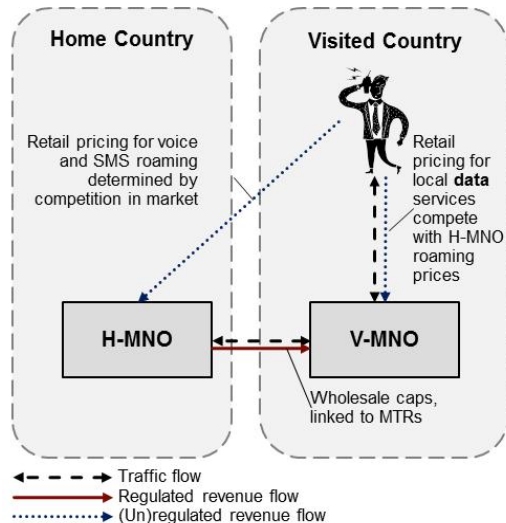
Disadvantages

- Additional post processing has to be setup
- Additional technical interface for steering of roaming to be specified
- Differentiation and validation between volumes claimed by home network and alternate roaming provider has to get solved. (At which time was user customer of which provider ? There may be overlapping claims.)



“Local break-out” implementing solution is restricted to data roaming only

Description



- **“Local break-out” offer only applicable for data roaming services** with some impact on voice/SMS roaming:
 - Customer has to make sure that he/she is using the chosen network for voice and SMS roaming as well
- “Local break-out” means: Visited network operator provides access to the (open) internet while abroad (access locally via chosen network)
- Customer can select between Home MNO (MVNO) data roaming and alternative Data Roaming offer from Visited network operator without changing handset or SIM
- “Classic” voice and SMS roaming would not change
- Customer keeps same number

Implementation issues

- It is proposed to introduce a unique APN¹ in order to allow for a pan-European Internet Access while Roaming.
- APN selection can be facilitated by operators, requiring no physical setting by customer (e.g.: configuration SMS).

1 APN: Access Point Name = Access point to the mobile data network

**Detailed
Assessment
see next page!**



Legend: H-MNO/MVNO – Home MNO/MVNO
V-MNO – Visited MNO
H-M(V)NO Roam. – Roaming M(V)NO/ alternative Roaming Provider

“Local break-out” implementing solution: Assessment - disadvantages clearly outweigh the benefits

Benefits (“PROS”) of Local break-out implementing solution

- Customer can select between Home MNO (MVNO) data roaming and Visited MNO data roaming offer without changing handset or SIM; Customer keeps same number; “Classic” voice and SMS roaming would not change
- Solution offers an open access to the internet similar to WiFi-hotspot access
- Less technical complexity compared to other possible structural solutions – mainly because the approach is restricted to data

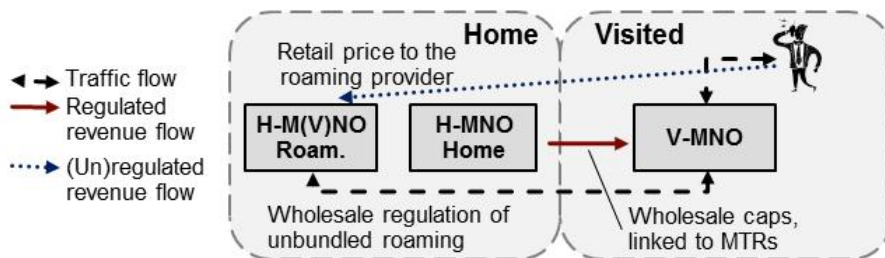
Disadvantages (“CONS”) of Local break-out implementing solution

- Customer experience
 - Customer needs to compare and analyze local Data roaming offers, to book an offer (abroad) and to register on the “correct” network abroad. This all adds additional complexity. Customer has to settle local contract and payment.
 - Unexpected / unrecognized changes of network cause fallback to HMNO. Additional charging from HMNO confuse Customer.
 - Key services, especially for business customers, will not be accessible any more (see next bullet)
- **Local break-out solution can only support a limited range of data services – i.e. only those services which do NOT require technical support from the Home network** – examples:
 - **Blackberry** (BB) service won’t be available any more
 - Access to a “**Virtual Private**” Network (VPN) can’t be provided any more via the local break-out solution
- Major negative consequences if the HMNO would have to actively support his customers, for the ease use, to opt out for local services. Complexity and cost driver coming from network initiated and controlled changes of terminal setting **online in realtime**.
- Unclear how to deal with financial/volume limits for outstanding charges for data roaming (Transparency clause; e.g. which party is responsible for monitoring/controlling the usage of Data roaming services)



“Dual IMSI” implementing solution is widely considered to be the most disadvantageous alternative with regard to customer experience and implementation efforts

Description



- This option enables the Alternative Roaming Provider to manage roaming traffic and have full control of the SIM profile during roaming
- Customer has flexibility to choose any M(V)NO within the home market or from abroad as his/her Alternative Roaming Provider
- Customer keeps same number but has to change SIM card

Implementation issues

- This option would require the Alternative provider of roaming services to establish the technical possibility to control the SIM card of the customer while roaming; thus, every customer who has chosen a different roaming provider will need **two separate “identities” on the SIM card**: one from the roaming provider and one from the provider for national services
- Such identities are established by storing the customer’s profile/ International Mobile Subscriber Identity (IMSI) of both the roaming provider’s network and the network for domestic services on the customer’s SIM card (therefore the model is also called the “DUAL-IMSI” solution)

**Detailed
Assessment
see next page!**



Legend: H-MNO/MVNO – Home MNO/MVNO
V-MNO – Visited MNO
H-M(V)NO Roam. – Roaming M(V)NO/ alternative Roaming Provider

“Dual IMSI” implementing solution: Assessment

- disadvantages clearly outweigh the benefits

Benefits (“PROS”) of Dual IMSI implementing solution

- Customer has flexibility to choose any MNO or full MVNO within the European market as the alternative Roaming Provider; Customer keeps same number
- In general in line with EU-Commissions expectations; except timeframe 2014 (see next)

Disadvantages (“CONS”) of Dual IMSI implementing solution

- Due to technical complexity (see next) “Dual IMSI” implementing solution won’t meet the 2014 deadline.
- Immense network technology complexity causing huge time & costs expenditures with regard to standardization, network implementation & roll-out
 - Exchange of SIM card necessary; SIM card to be enabled for hosting the additional customer profile related to the alternative Roaming Provider (➔ second IMSI); similarly network databases to be updated with the second customer profile
 - Synchronization needed between the network components of the Home MNO and the alternative Roaming Provider
 - **These functionalities are not part of a worldwide standardised solution. A new standard has to be developed first**
- Handset needs to be unblocked
 - Subsidized handset business model at risk
- Customer experience
 - Exchange of SIM card necessary
- Corresponding to the LBO solution only a **limited range of services will be supported (e.g., no Blackberry or VPN service)**
- Security and data protection issues



Any combination of different implementing solutions has to be avoided!

Any combination of different implementing solutions would be confusing for customers

- Customer experience: Although customer will keep same number, any combination of different solutions will be quite complicated to manage from a customer's perspective – example: “Single IMSI” PLUS “Local break-out” for Data
 - Imagine that a customer (a) keeps existing subscription with Home MNO for domestic services, (b) will be provided with voice and SMS roaming services through the chosen alternative Roaming Provider and (c) uses an alternative data roaming offer from a Visited network operator ...
 - ... this will result in 3 (!) different subscriptions; it's obvious that this dramatically increases complexity compared to the seamless, user friendly and secure nature of roaming services today

This will also result in major negative implications on the alternative Roaming Provider's business case if customer chooses a local break-out for Data – especially in case of LTE all roaming services will be moved onto the network of the Visited network operator

Any combination of different solutions would be extremely challenging for the industry

- Any combination of different implementing solutions would lead to a situation where operators are forced to assign their – limited – capacities to different implementation projects
 - ... this will become extremely costly for the industry to implement; especially as those combined solutions have to be compatible – a requirement which adds another piece of complexity and challenges the proportionality of the introduction of structural measures
 - ... and risks delays in implementation of both projects in parallel

