

Roaming Architecture for VoIMS with Local Break Out (RAVEL)

Deutsche Telekom – February 2011



GSMA VoLTE activity overview

- The GSMA started to work on Voice over LTE in 2009 in the Application Awareness Task Force
- The basic findings of the task force was the need for the VPLMN to distinguish voice traffic from other types of traffic
- The task force also laid the ground on the basic architecture principles and charging model to be adopted.
- In May 2009 the GSMA created the Roaming and Interconnect (of application services) over LTE (RILTE) which further developed the findings of the AATF
- Several other GSMA working groups are engaged in the voice over IMS area, particularly the InterWorking Roaming Expert Group (IREG), the InterWorking group (IWG) the Charging Principles Working Party (CPWP), the Billing, Accounting and Roaming Group (BARG) and many others



Current GSMA assumptions

- The following assumptions have been used in GSMA to further develop the work on roaming architecture and optimal media routing:

Voice over IMS in roaming should be delivered in Local Break-Out

- This was decided in order to mimic closely the way voice is provided in the CS domain
- LBO also allows visibility of the service in the visited network
- LBO implies that the P-CSCF and PDN GW are located in the VPLMN

Legacy charging and accounting principles should be used

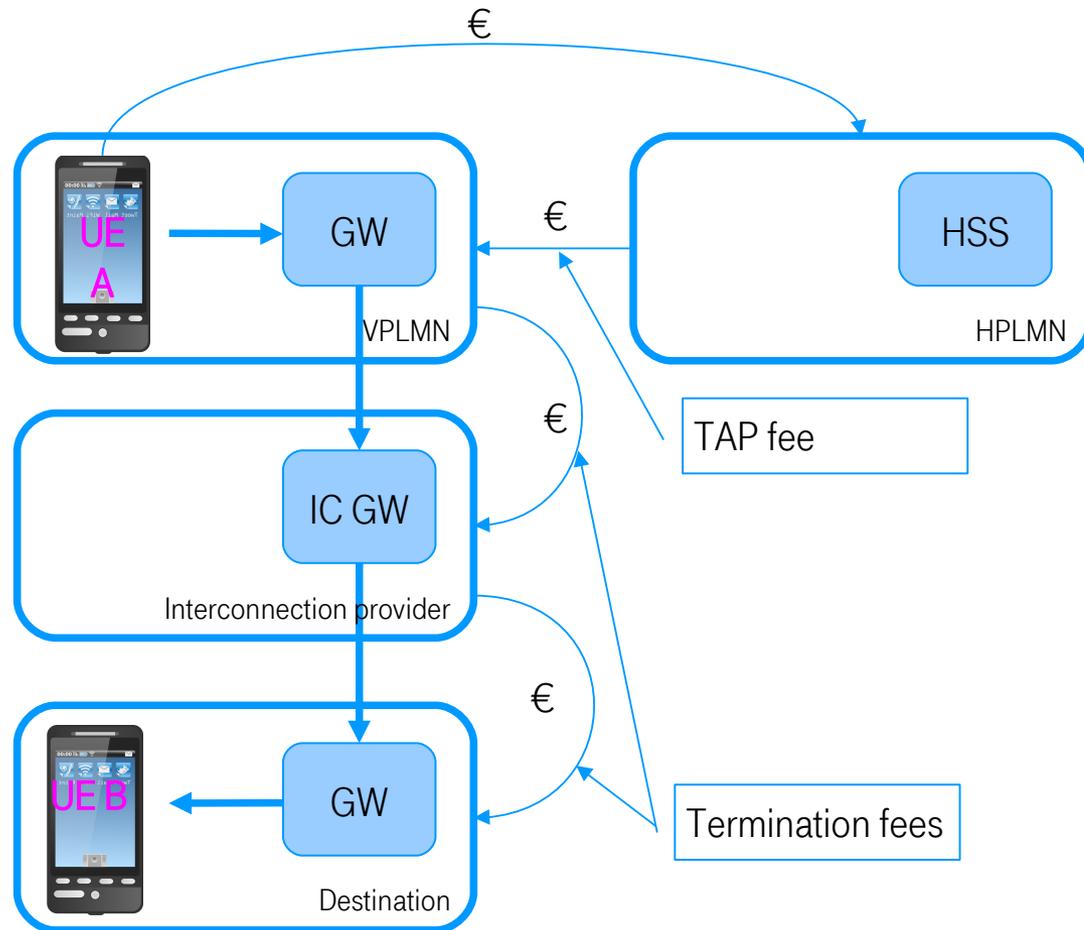
- This was decided to smooth the transition from CS voice to voice over IMS
- This also allows the re-use of existing roaming agreements and interconnection infrastructure
- Interoperator accounting HPLMN->VPLMN as well as chained voice termination fees for interconnection (VPLMN->IC1->...->ICn->Destination)

Maintain interconnection mechanisms

- Chain of service aware switches/hubs which route according to evaluation of the call control protocol (SIP/ISUP) the associated media (RTP/TDM)



CS voice accounting graphics



- When UE A is roaming the subscriber pays the HPLMN according to location and called party
- The HPLMN on turn pays the VPLMN according to location and called party
- The destination network and the interconnection provider receive termination fees according to the point of interconnect and called party

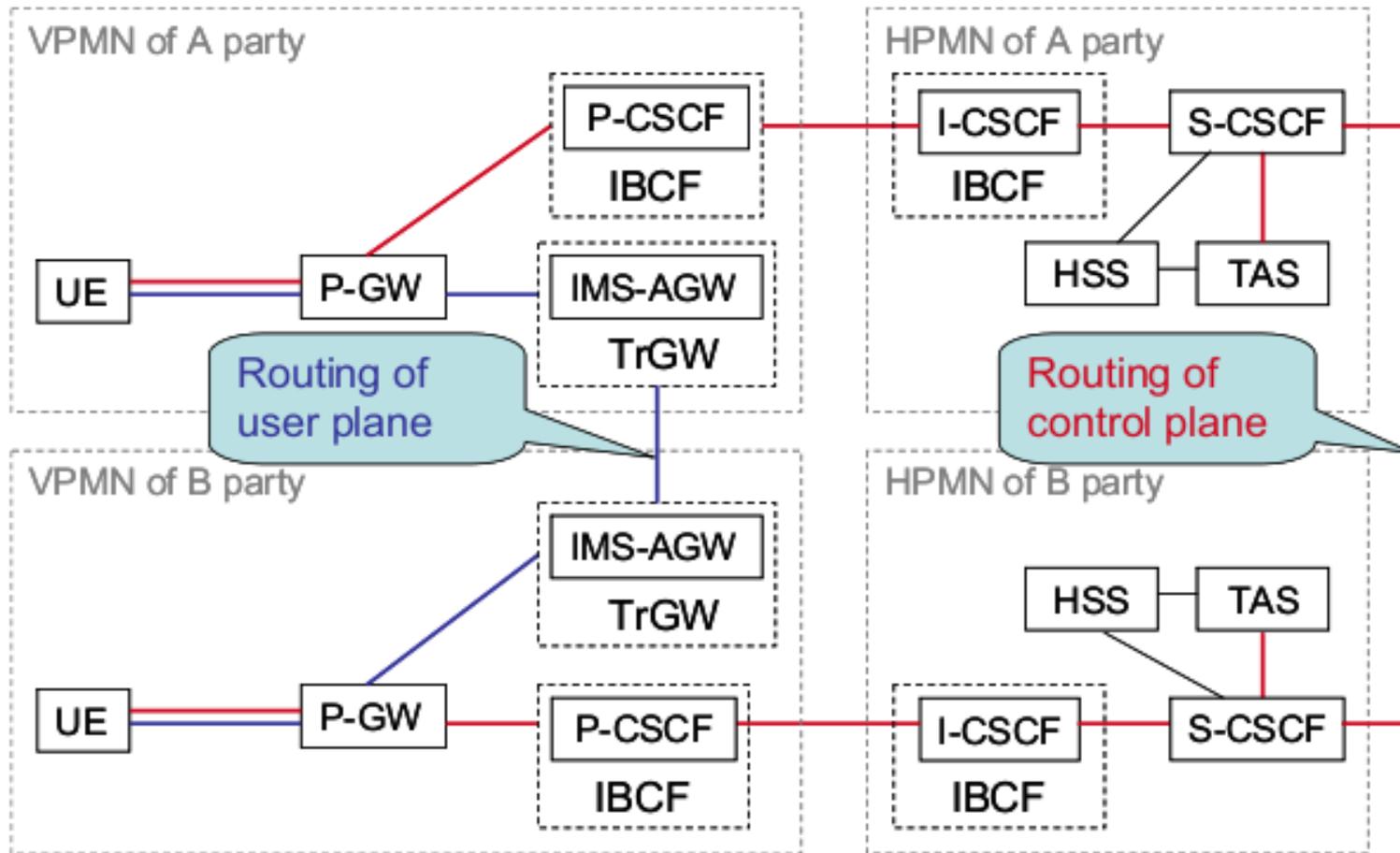


Considerations on CS voice accounting

- It has to be possible to apply a cascaded accounting model whereby only a trusted relation with the next hop is needed.
- Accounting need to take into consideration:
 - Service used
 - Duration
 - Destination address on voice application level
 - MOC/MTC differentiation
- There must be a match between the TAP record information and termination fees: this may lead to the need for any involved party to anchor the media
- The most important information in order to realize the current accounting model is the knowledge of the destination network.
- Accounting between HPLMN A and VPLMN A needs to be deterministic and not depend on potential further processing by HPLMN B (e.g. terminate to own access, apply call forwarding, forward to outbound roamer).



Reference VoIMS roaming architecture in GSMA



Source: IR.65 version 5.0 figure 4-4



Considerations on GSMA VoIMS architecture

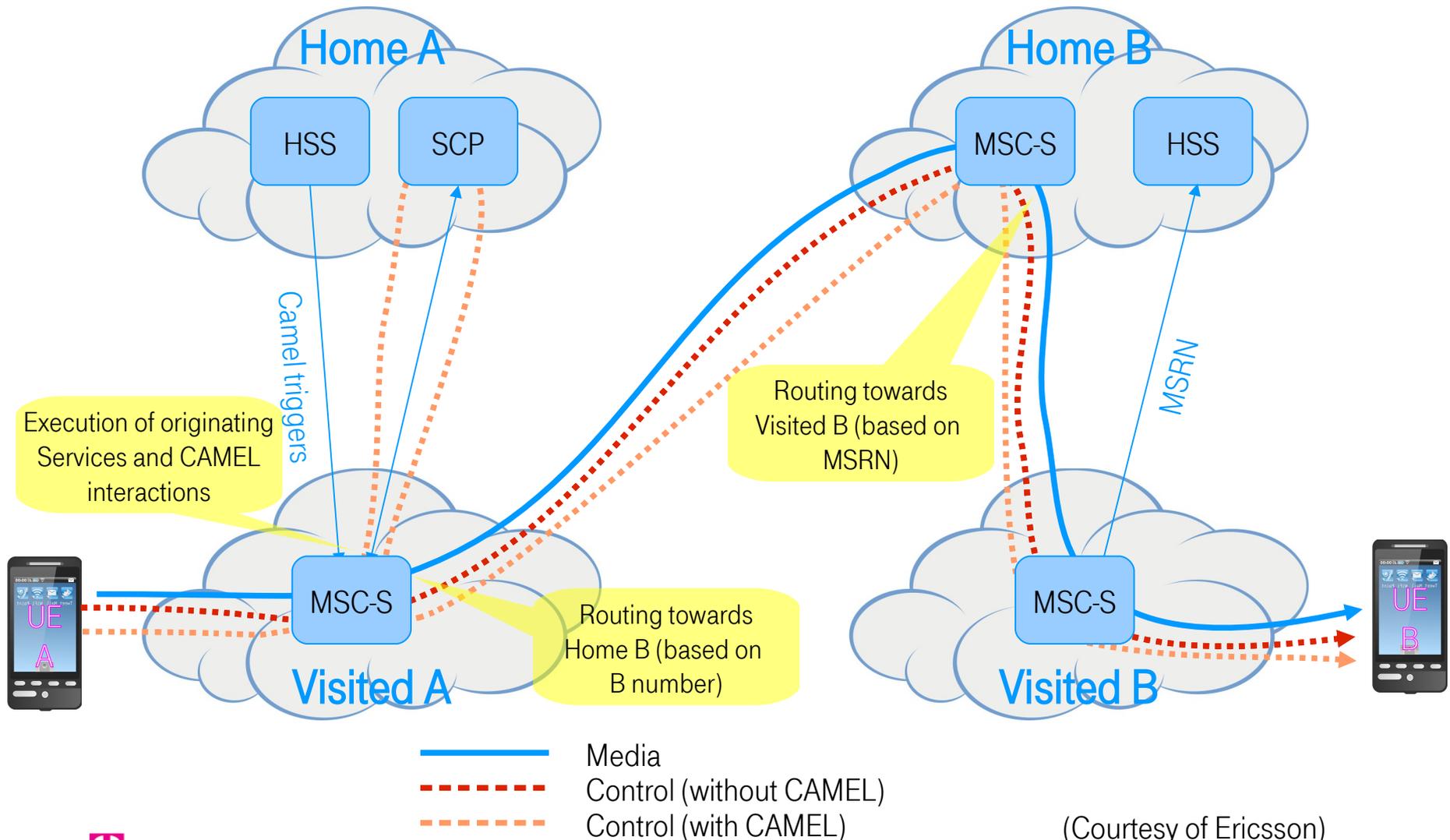
- The architecture assumes the use of Local Break-Out, meaning that the UE will contact the P-CSCF in the VPLMN and the VPLMN will originate the media plane
- As the call control is executed in the HPLMN A, the control plane follows the path VPLMN – HPLMN – Destination network (similar to CS voice with CAMEL)
- The media plane is directly routed from the network serving the calling party to the network serving the called party. Note: the actual requirement in GSMA is that the media plane is at least as good as the user plane routing for CS voice.

Some shortcomings however exist with the solution:

- Unclear how access gateway selection allows the media and control planes to converge to the same P-GW and thus form the necessary interconnection reference points.
- Only the IMS to IMS case is illustrated, it is assumed that all PLMNs and interconnection providers support IMS, so unsuitable for the service ramp up case when a mixed PS and CS networks environment will be predominant.
- Will not result in the legacy accounting mechanisms as applied today between PLMNs and for Interconnection (voice minutes, duration, destination)



"Legacy" CS voice roaming architecture

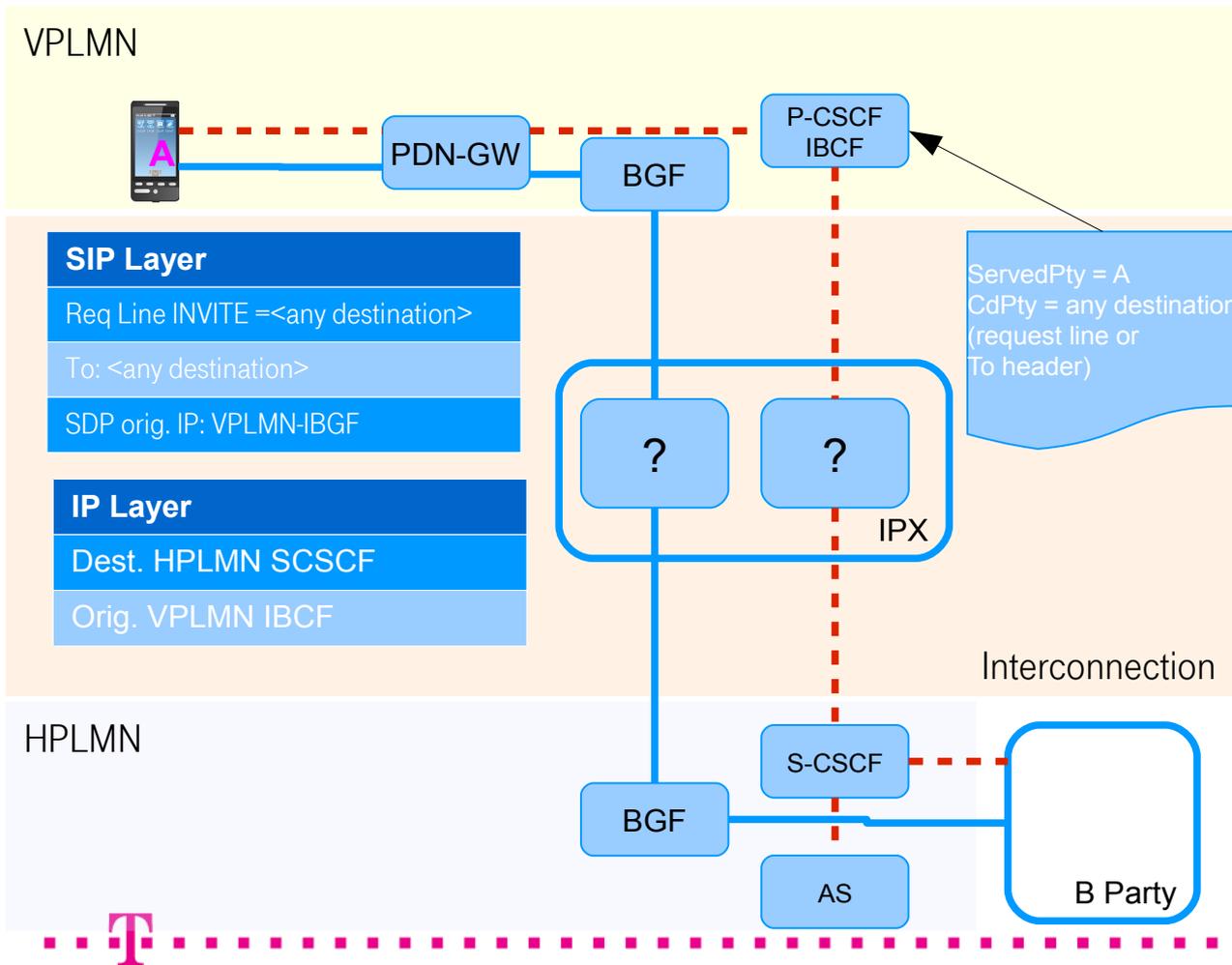


Comparison between GSMA Roaming architecture and CS voice architecture

- Service control in IMS is already in the HPLMN A. In CS voice architecture the HPLMN can only exercise service control via CAMEL (80%-90% of CS roaming traffic today hence depicted also in previous diagram). IMS voice control copies the CAMEL principles.
- CS voice and VoIMS allow OMR with direct media path between VPLMN A and VPLMN B as an extension of the basic “non optimised” approach if the involved PLMNs agree to apply OMR



Example of a possible problem



- IPX could be SIP proxy + media gateway or IP router.
- Called party may be a short code or VPN translated by the AS in HPLMN.
- The P-CSCF record cannot be used for distance based charging.

How is the RAVEL work item fitting in this picture?



RAVEL objectives highlights

- RAVEL intends to study if architecture enhancements for IMS voice roaming are needed in order to be able to create for voice over IMS a charging model as close as possible to the existing model used for CS voice
- In order to achieve this
 - the media plane needs to be switched by the VPLMN A (LBO)
 - Information collected by the VPLMN A in CDRs need to match those collected in the HPLMN A for inter-operator charging
 - If the HPLMN A modifies the call (e.g. changes the destination number) this information has to be passed to the VPLMN A
 - There should be no difference between routing a call for a own user and an inbound roaming subscriber for the VPLMN A
 - The VPLMN A should have complete freedom to choose the preferred interconnection partner



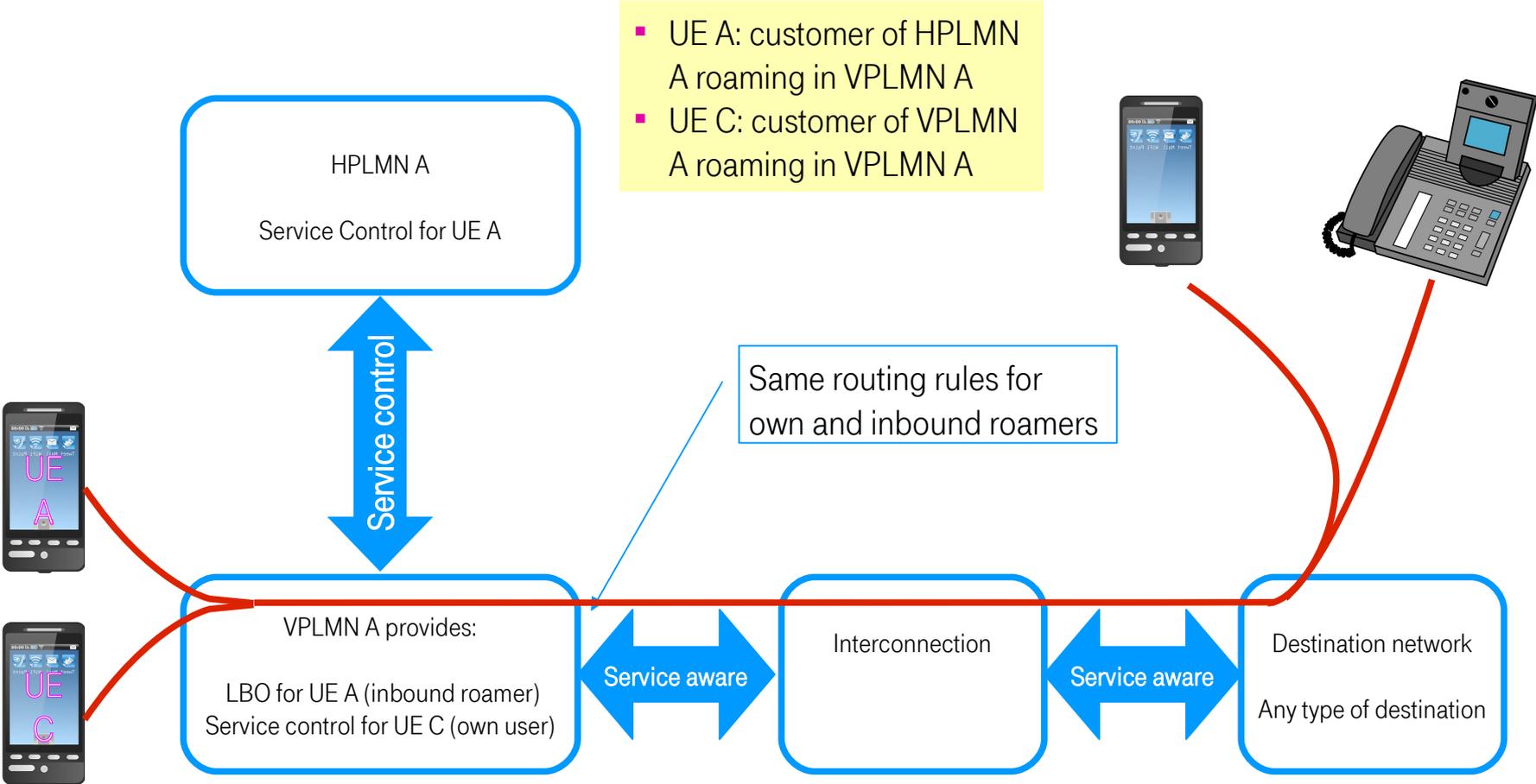
RAVEL objectives highlights

- Unlike “vanilla” CS voice, in IMS the call is controlled by the HPLMN which decides the destination number (think of Camel Destination Routing Number) and as charging by the PLMN is based on the final destination number, this has to be communicated to the VPLMN.
- In order to enable distance based charging the address parameters shall provide the identity of the network operator. This might be either
 - an E.164 number with CC NDC within tel-uri or the corresponding user part of a sip-uri with user=phone indication or
 - a sip.uri with a domain associated to a network operator (e.g. xyz@operator.cc)
- Whereas the GSMA has only considered the IMS to IMS case, 3GPP should provide a solution where the Destination network and interconnection network type can be of different type (PSTN, CS, etc...)



RAVEL objectives highlights (graphical representation)

- UE A: customer of HPLMN A roaming in VPLMN A
- UE C: customer of VPLMN A roaming in VPLMN A



Relationship between RAVEL and OMR

- Optimal media routing could be considered an add-on to RAVEL, but the scope is different: **OMR in itself does not provide a solution to the replication of the CS voice charging model**
- The architecture to support VoIMS roaming with LBO is not meant to preclude the use of OMR or the optimization of the media plane routing in the interconnect network
- Whereas the charging model resulting from the RAVEL work item is well known and used globally, it is still unclear if a sustainable charging model exists when OMR is applied.
- Home routing of media plane (back to the subscriber's HPLMN) may be required in some circumstances.



Relationship between RAVEL and OSCAR

OSCAR should be seen as a continuation of the basis laid by RAVEL.

- OSCAR aims to
 - solve some practical problems due to the media plane bypassing the HPLMN, in particular enabling the VPLMN to perform Conferencing, Transcoding, Tone insertion, Announcements insertion.
 - Allow the VPLMN to provide appropriate charging records for roaming users whose media is routed in an optimal manner.
- The first objective is independent of the charging architecture for VoIMS
- The second objective should build on the charging for the basic routing case that is RAVEL's scope.
- As experience shows that optimal routing in GSM has not enjoyed a great deal of commercial success and since there is no reason why it should be different for VoIMS which is meant to be based on the same charging principles; **it makes sense to study first the basic scenario**

