7ᵀᴴ ANNUAL I3FORUM CONFERENCE

CHICAGO, IL

IMS interconnection: specification and open issues

MAY 12ᵀᴴ, 2016

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**TI SPARKLE**

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AGENDA

- **The mobile IMS scenario**

- **The i3 forum IMS interconnection specification**

    - **Business models**

    - **Protocols, codecs**

    - **Interconnecting scenarios**

    - **Roaming models**

- **Issues for further analysis**

SCOPE

- **All session based services, such as voice and video**

- **Related signalling services**

- **Messaging services including RCS**

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THE MOBILE IMS SCENARIO
(FOR SESSION-BASED SERVICES)
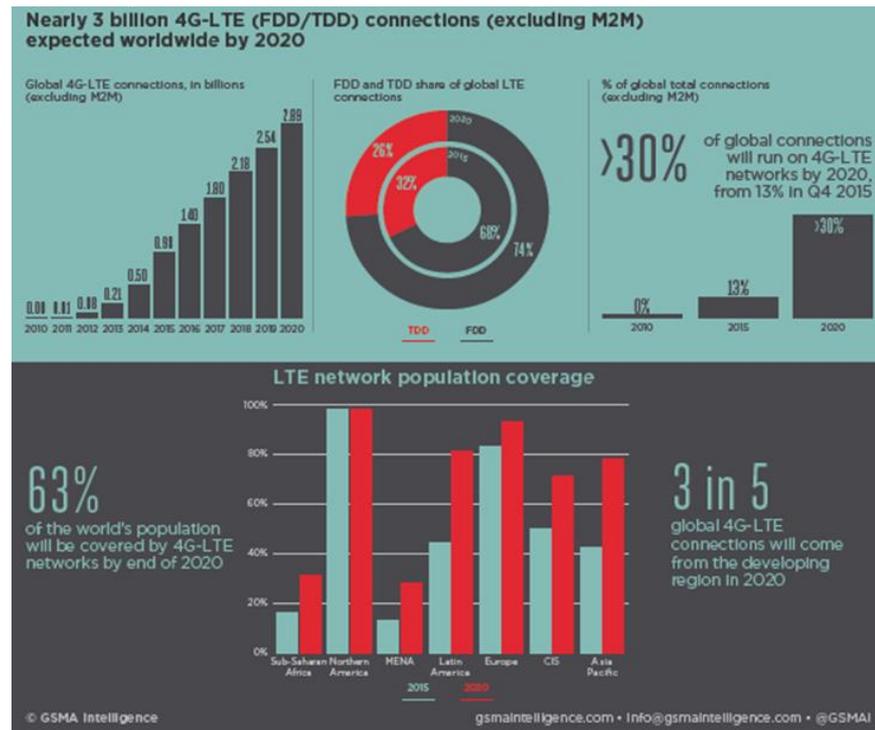
Source: GSMA 2016

Industry takeaway — *LTE is a consolidated technology worldwide*

VOLTE WW DEVELOPMENT BY MNOS

The list does not claim to be exhaustive

Europe
- EE
- TeleDenmark
- Swisscom
- VF Germany
- VF Romania
- TIM
- VF Italy
- O2 Germany
- T-Mobile
- Orange Romania
- Orange France
- ....

Canada
- Rogers

USA
- Verizon
- AT&T
- T-Mobile US
- Metro PCS

Korea
- SKT
- KT
- LG

Japan
- NTT Docomo
- KDDI

China
- China Mobile

HK
- CSL
- 3 HWG

Singapore
- Singtel
- Starhub

Australia
- Telstra

- **GSMA (@ Mar. 2016) claims 51 VoLTE networks ww: trial /commercial service**
- **Far East is at fore-front: all Koreans MNOs are VoLTE enabled and are fully domestically interconnected**
- **Nearly 10 roaming trials planned / implemented all service unaware (data oriented)**

Industry takeaway — *When VoLTE traffic (transit and roaming) will start to take-off?*

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i3 FORUM DELIVERABLES ON IMS

Technical and Commercial Analysis of International Interconnection and Roaming Services" (Rel. 2) May 2016

Interconnection & Roaming IMS Signalling Profile (Rel. 3) May 2016

Scope:

- Strategic environment **for fixed and mobile communications**
- Reference architectures **adopting IPX at the transport level**
- IMS SIP signalling protocols **to be used at I-NNI interface**
- Interfaces, protocols and codecs to be adopted at inter-IMS border and between IMS and non IMS networks
- Security principles
- **Transit IMS calls interconnecting calls and roaming calls**
- **The related business models together with QoS control discussion**

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IMS SERVICES AND RELATED BUSINESS MODELS

IMS Service (over IPX)	Business Model between SP and IPX P	Charging metrics
(HD) Voice	Sending Party Pays (cascading)	Minutes per destination
Videocall	Sending Party Pays (cascading)	Minutes per destination (+volume, ref. GSMA IN.27)
Signalling (Diameter)	Flat Fee or Per Transaction Fee	Number of Transactions
Signalling (*) (SIP IMS)	Flat Fee or Per Message Fee	Number of MSU
Enhanced Messaging(RCS)	Hubbing?	Minutes / Events / Volume per destination (ref. GSMA IN.25)
SMS/MMS	Sending Party Pays (cascading)	Message for destination
IPX Transport	Flat Fee	Port capacity (Mbit/s)

(*) For the 3 types of SIP IMS signalling

Industry takeaway *Variety of business models together with a variety of charging schemes => efficient OSS/BSS chain*

IMS SIGNALLING

"Interconnection & Roaming IMS Signaling Profile Rel. 3 (May 2016)"

- endorses **3GPP TS29.165** *"Inter-IMS Network to Network Interface"* to be applied between SP and IPX Providers and between 2 IPX Providers

- provides **an operational specification** (detailed compliance) of the 3GPP document

- covers a larger scope: basic voice services, SMS, basic video and RCS either in the transit or hubbing mode

- allows for future extensibility for support of the GSMA IPX requirements

- reviews and comments GSMA PRD IR.95 *"SIP-SDP Inter-IMS NNI Profile"*

Industry takeaway *It is recommended that this Signalling Profile should be supported as the minimal profile on the Inter-IMS NNI*

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CODECS AND TRANSCODING

Rec. Narrowband Codecs

Mandatory Narrow band codecs	Optional Narrow band codecs
G.711 A-law, μ-law 64 kbit/s: Mandatory for IMS interworking	**AMR-NB:** Mandatory in terminals using 3GPP access to the IMS
G.729, G.729a, G.729b, G.729ab, For interworking with existing VoIP networks	

Rec. Wideband Codecs

Mandatory Wideband codecs
G.722: Mandatory for IMS interworking
G.722.2 (AMR-WB): Mandatory for VoLTE in GSMA IR.92: *Opus?*

Transcoding: **adversely affects the quality of the communication**

1. Transcoding should be avoided when it impairs speech quality.
2. Wideband codec continuity with no transcoding => the optimal quality scenario.
3. Transcoding to NB codecs to be avoided unless is the only way for call completion
4. **A call, where transcoding between two different wideband codecs takes place, has better quality than the same call using a unique NB codec end-to-end**
5. No significant quality improvements are expected if a call, in some segments, is converted to wideband versus an end-to-end narrowband quality.
6. If both narrowband and wideband codecs are offered in a voice IMS session, the wideband ones should be placed in the top priority positions in the SDP offer.
7. The order of codec/packetization period preference is determined by the originating terminal and should be honored wherever possible;
8. **In the first instance it is the responsibility of Service Providers to support transcoding in order to ensure successful voice interoperability for their services.**

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INTERCONNECTING IMS NETWORKS

A) IMS to IMS with No fixed/mobile interworking

B) IMS to IMS with fixed/mobile interworking

Services: all IMS-based services

Physical Interconnection: standard IP interconnection; variety transmission systems

Signalling: 3GPP TS 29.165 => No interworking / interoperability is required.

Transcoding:
A) codec transparency (*almost*) guaranteed.

B) In case no successful negotiation of a common wideband codec on each side => transcoding. In any case, G.711 fallback can be performed

Addressing and Routing:
- Tel-URI, SIP-URI user=Phone
- **SIP-URI Alphanumeric** ✖
- IPX requirement: max 2 hops

C) Interworking with legacy networks

D) Interworking with VoIP networks

Services:
- Voice; support of supplementary services needs evaluation
- Mobile HD voice with TrFO only
- *In VoIP SD and HD voice supported*

Physical Interconnection: standard IP interconnection; variety transmission systems

Signalling (from ISUP, SIP to SIP IMS): interworking performed by the 1st IPX Provider

Transcoding: when transcoding needed, as common practice the originating Service Provider takes care of it. In any case, fall back to the G.711 codec.
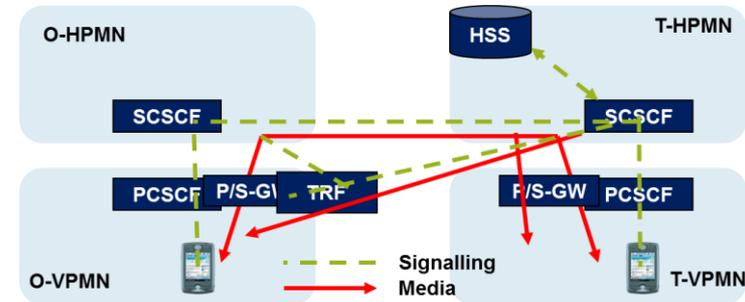
OTT codecs to be considered

Addressing and Routing:
- Tel-URI, SIP-URI user=Phone
- *mapping from the OTT to telco addressing scheme in the OTT Providers domain.*
- IPX requirement: max 2 hops

VOLTE ROAMING SCENARIOS: 2 STANDARDS

Service Aware: LBO (in GMSA IR.65) (based on IMS signalling)

- **Voice oriented solution => same business model as in 2G/3G**
- Signalling goes back to Home network, which, call by call, decides the call routing via visited network (LBO) or via home network (HR) => **impact on Signalling services**
- Emulate 2G/3G voice services with VoLTE
- Full IMS interworking needed between roaming partners

Service Un-Aware: S8HR (in GSMA IR.65) (based on IMS signalling)

- **Data oriented solution => new business model**
- **Push from some MNOs for technical/commercial reasons** => GSMA Revolver TF
- VoLTE on LTE Data Roaming framework **with QoS differentiation based on QCI/APN**
- No IMS-level interwork b/w roaming partners
- Open issues: lawful intercept and support of emergency services

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SOME ISSUES FOR FURTHER ANALYSIS (1/2)

- *VoLTE Hubbing definition* leaving to each Int. Carrier the definition of its own commercial policy, the general framework for VoLTE Hubbing should be discussed with MNOs (GSMA)
  - *Interconnection implementation:* testing in field needed for getting "real experience"
  - *Transcoding* there is no specification on who and how has to transcode => commercial and technical impact

- *Roaming model (LBO + S8HR) adoption*
  - *Which model?* Uncertainty and confusion on market direction
  - *Commercial issues:* who (business-wise) wins and who loses?
  - *Technical issues* still to be solved

- *ViLTE take-off?*
  - *Domestic profile* from the technical perspective (e.g. codec H.264) and business perspective (charging per GSMA IN.25/IN.27)
  - *Interconnection implementation* as above for VoLTE
  - *Transcoding* with OTT codecs (e.g. VP8)?
  - *Roaming* as above for VoLTE

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SOME ISSUES FOR FURTHER ANALYSIS (2/2)

RCS

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- *RCS offering*
  - *Which Profile:* Joyn, Blackbird or the new Universal Profile GSMA announced at MWC2016 with Google?
    - Commercial issues: which business model and how to charge
    - Technical issue
  - *RCS Hubbing?* Role of Google/Jibe offering three different alternatives
    - RCS/Jibe client
    - RCS/Jibe hosted solution
    - RCS/Jibe hubbing solution

Web RTC

- *WebRTC* based on a different language: HTML5 and Java-based APIs; gateway available from Vendors
  - *Interoperability* between some browsers available; standardisation advanced (W3C, IETF, ETSI, 3GPP)
  - *WebRTC Gateway* available from Vendors
  - *Applications* for a number of B2C services (travel, housing, gov. agencies…) services

| i3 forum plan | *i3 forum is committed to analyse and study the above issues, possibly jointly with other bodies* |

Thank You

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