
**ITU Workshop on “Voice and Video over LTE”
Geneva, Switzerland, 1 December 2015**

VoLTE/ViLTE Implementation:

*Solving interoperability challenges through standards
and open market devices*

**Doug Makishima, GSMA
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Who is the GSMA?

The GSMA represents the interests of mobile operators worldwide.

Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 230 companies in the broader mobile ecosystem

Deliver

- Operator-led 'Vision 2020' strategy development
- Collaboration with 'lead' and 'participant' operators
- In-market support to create 'success stories'



Advocacy

- Stimulate global telecoms investment
- Demonstrate value of mobile telecoms connectivity
- Enhance dialogue between MNOs and governments
- Ministerial Programme platform for industry leaders

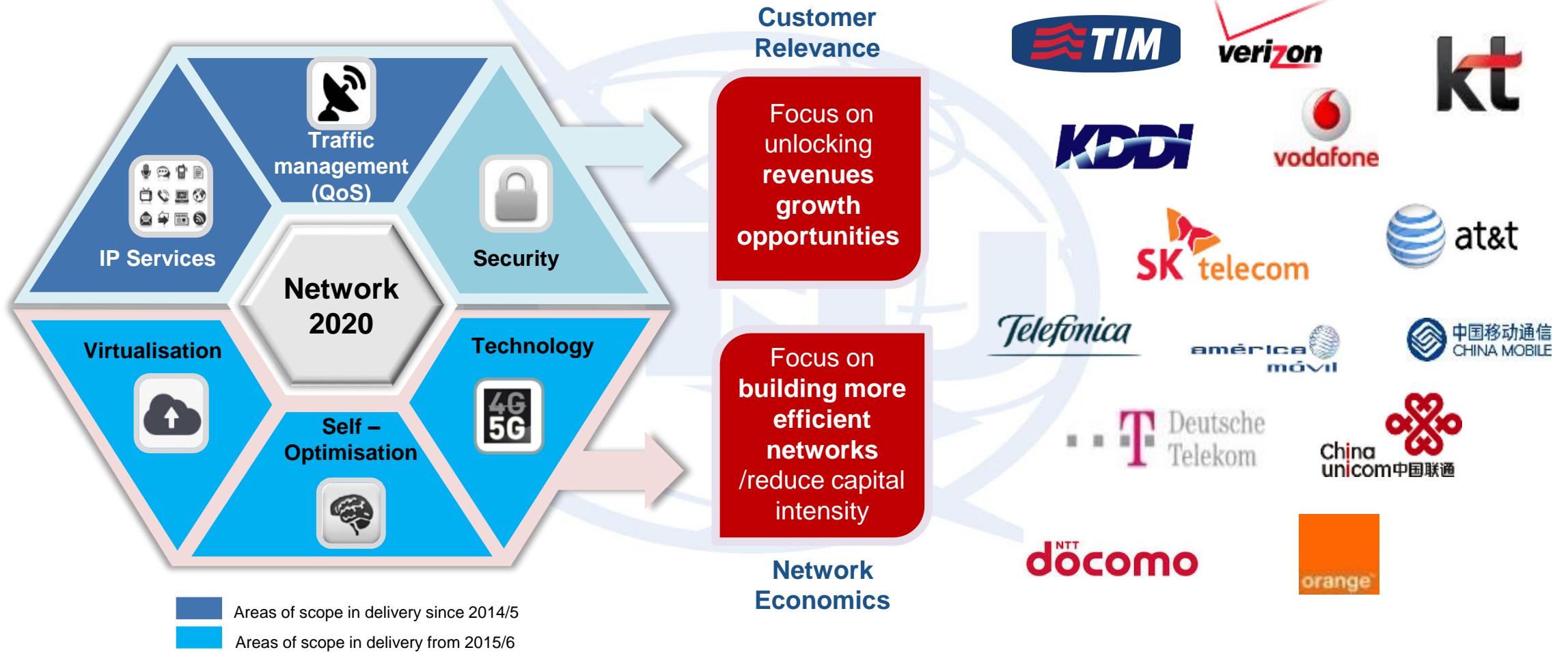


Convene

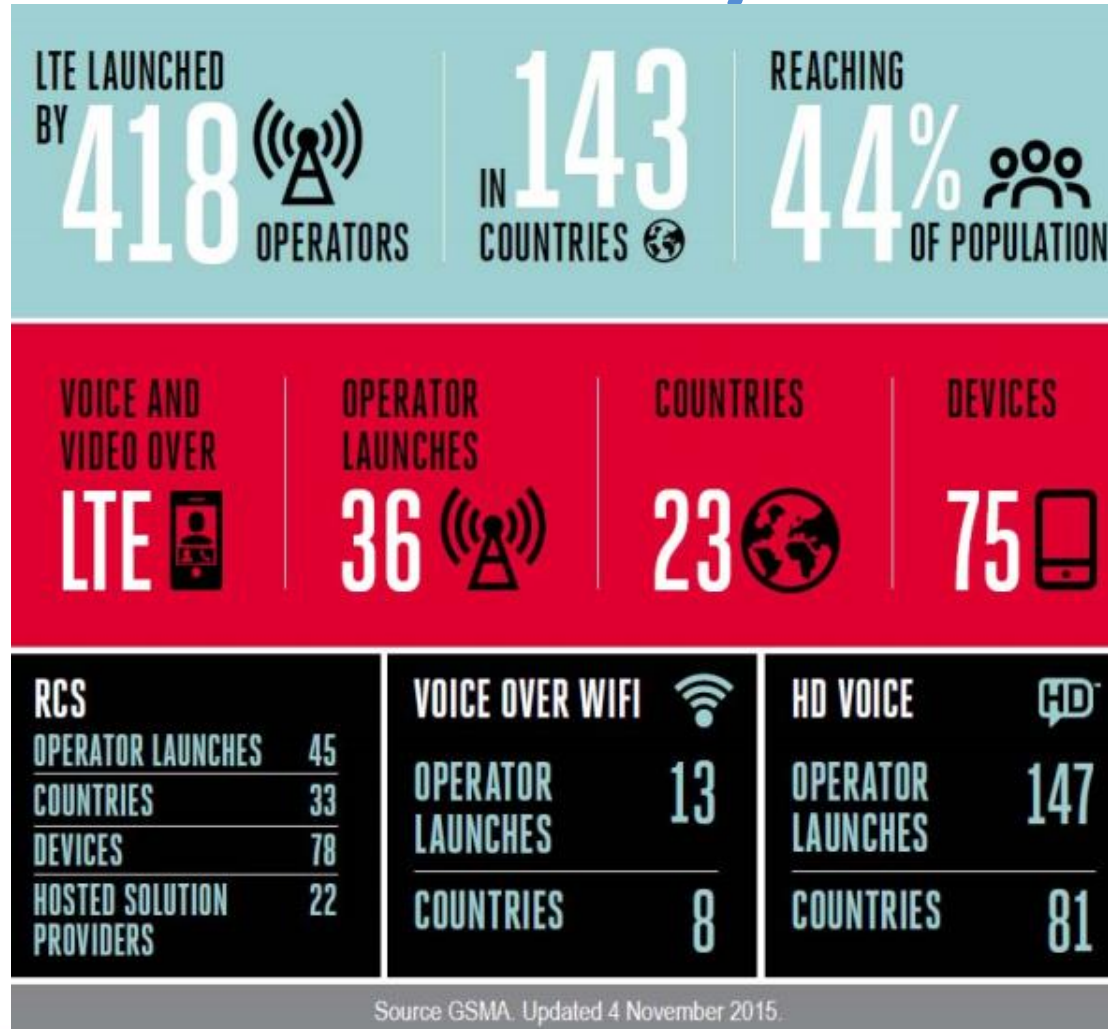
- Enhance dialogue across the value chain
- Ecosystem collaboration and advocacy positions
- Engagement via global and regional platforms



GSMA Network 2020 Programme – Building Blocks for the Networks of the Future



N2020 Key Statistics and Resources



Knowledge: All-IP business guide



<http://www.gsma-all-ip-business-guide.com>

Resolution: IP Resolution Centre

481 Issues

88% Solved

<http://www.gsma.com/network2020/ip-communications-issues-registry>



N2020 VoLTE Interoperability Initiative

Doug Makishima - dmakishima@gsma.com

Network 2020 VoLTE Interoperability Initiative Goals



- Increase recognition of fragmentation and importance of convergence
 - Encourage compliance to standards
 - Analyze and document differences
- Drive VoLTE maturity and interoperability through convergence & standards
 - Reduced fragmentation to support OMDs (Open Market Devices) and roaming
 - Accelerate VoLTE deployments:
 - Increased implementation leverage through reuse
 - Reduced IOT testing and greater device availability speeds deployment (including even single, non-interconnected deployments)
- Improve process and communication
 - Refine process for collection, analysis and resolution of IOT issues
 - Create knowledgebase and interactive communication platform
- Create conformance initiative
 - e.g. IOT test events, specs, process and facilities

Key VoLTE Interop Considerations



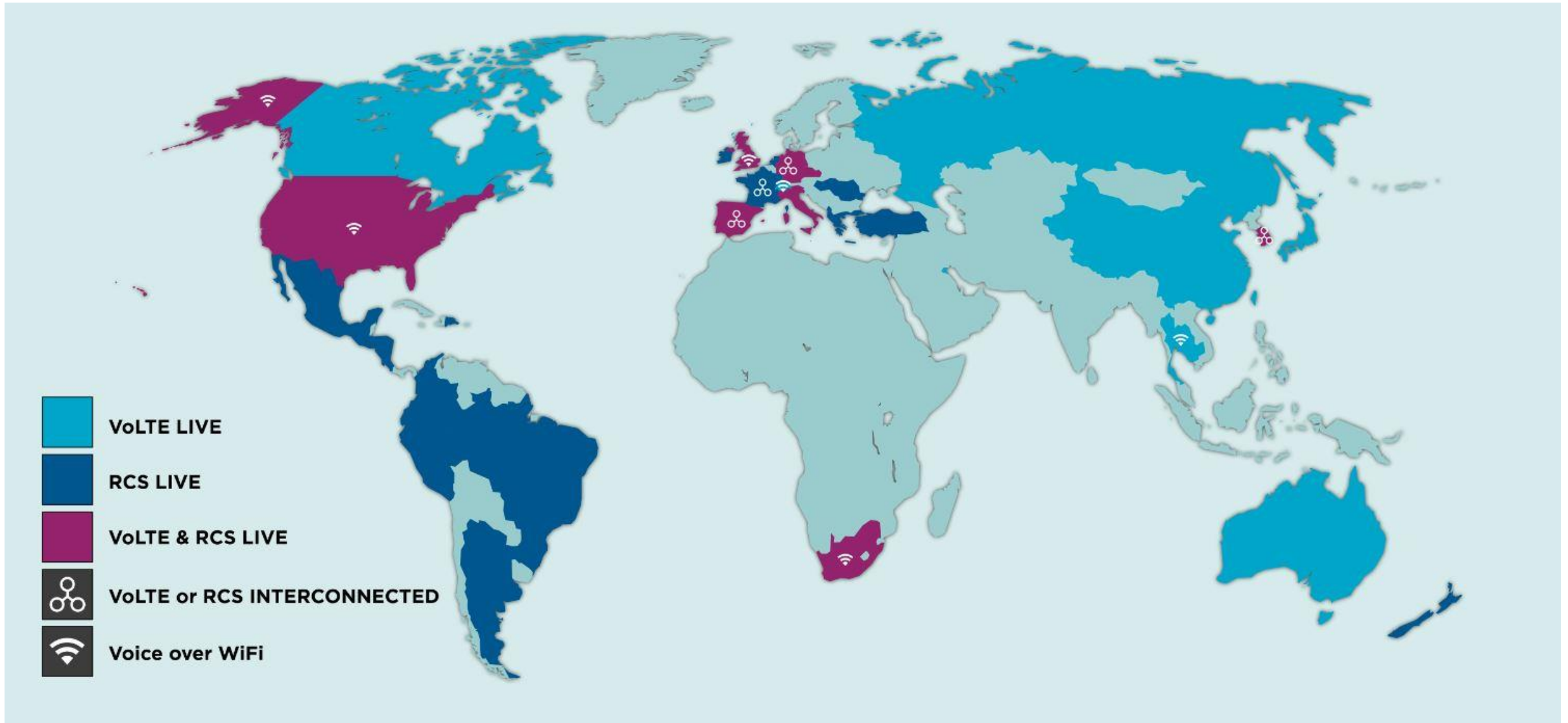
- Key Considerations
 - 36+ VoLTE operator launches; UNI interoperability (UICC portability) slowly emerging
 - Open Market Device (OMD) distribution model is 60% of market
 - Roaming becoming a reality
 - UNI fragmentation impacts NNI for interconnect
 - Other implications: Public safety, emergency call, regulatory (e.g. lawful intercept)
 - VoWiFi: IR.51 “IMS Profile for Voice, Video and SMS over Wi-Fi”, and is based on IR.92, IR.94 and IR.61

- “Global” Open Market Device (OMD) Profile
 - IR.92 already is the “Global Profile”
 - GSMA IR.92 = ‘IMS Profile for Voice and SMS’ & GSMA IR.94 = ‘IMS Profile for Conversational Video Service’
 - But - it can be improved through updates & recommended option settings, and implementation guidelines

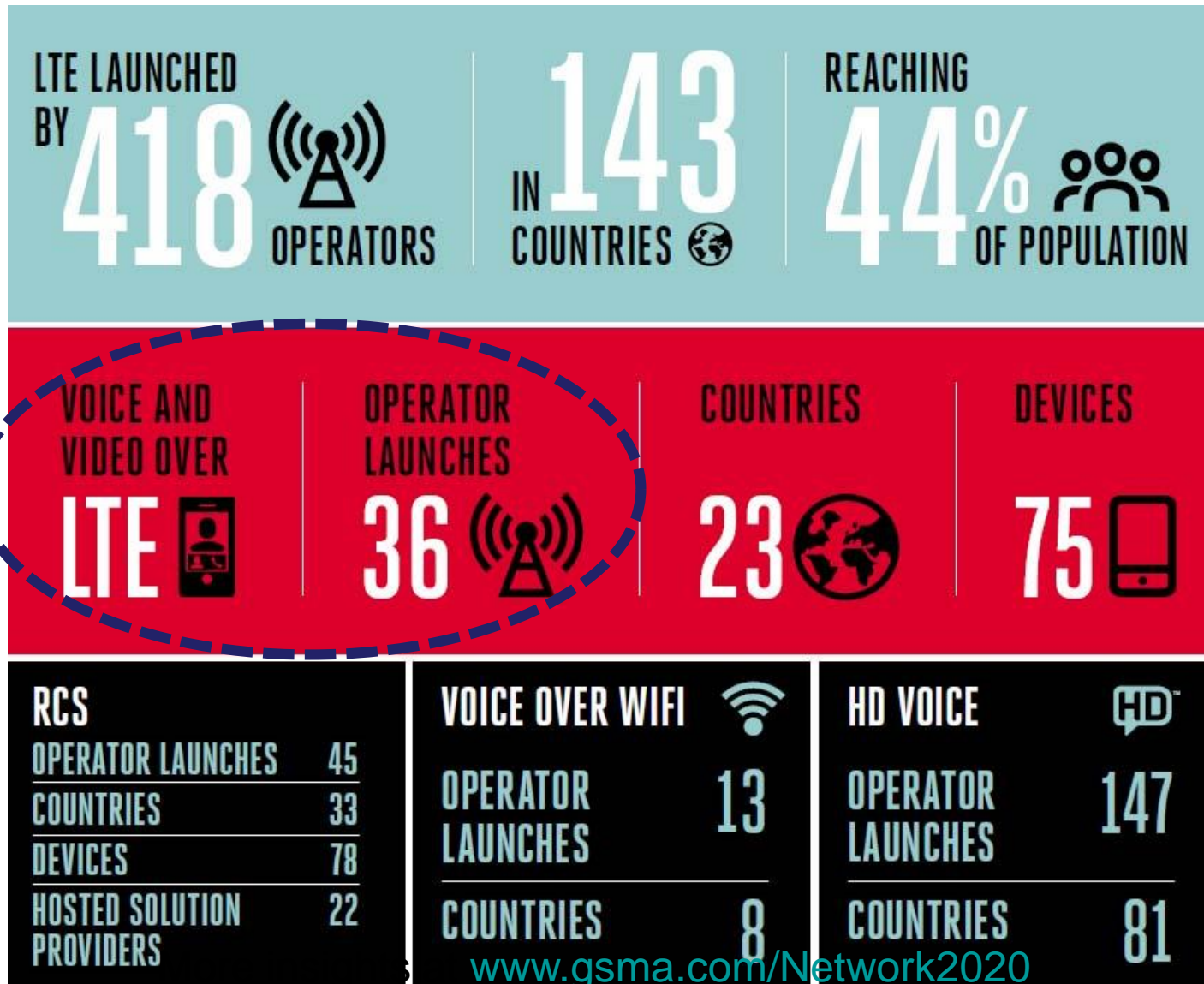
VoLTE Market Overview

Network 2020

IP Communications Deployment Landscape



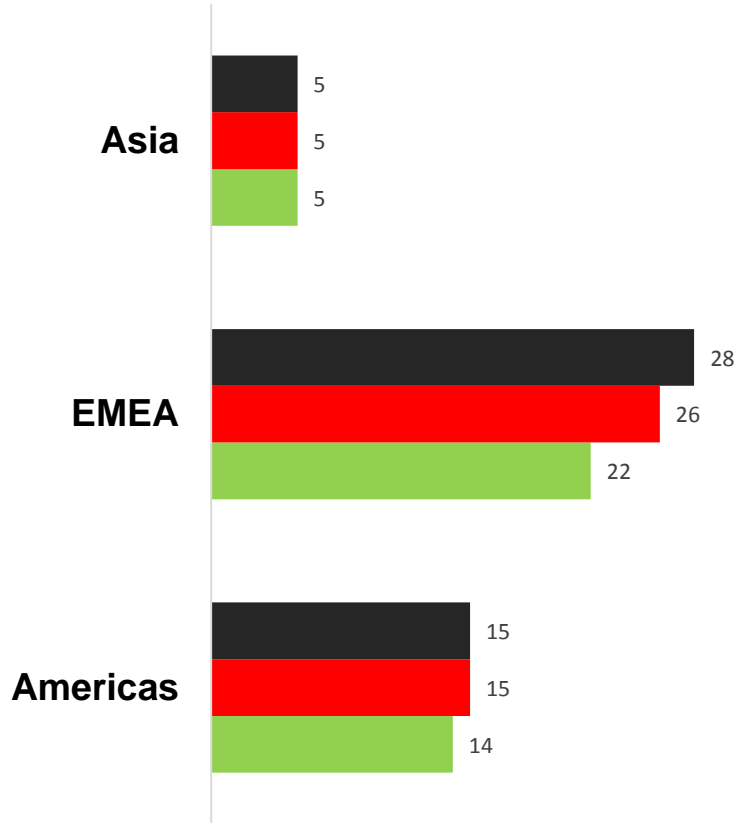
Current VoLTE Stats: >36 Operators & 75 Devices



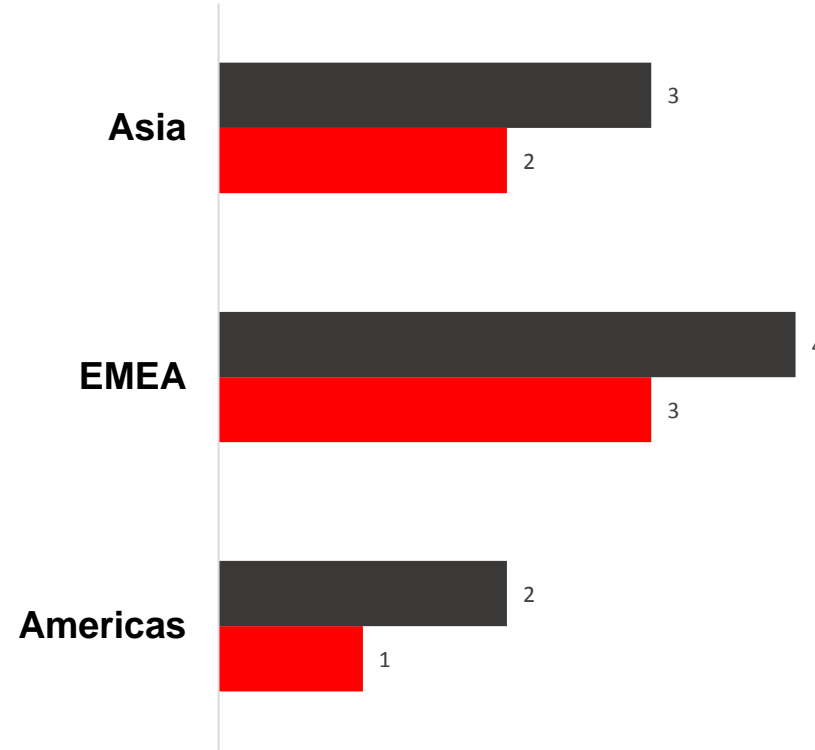
Operators' Launch Commitments for 2015/16 are Accelerating



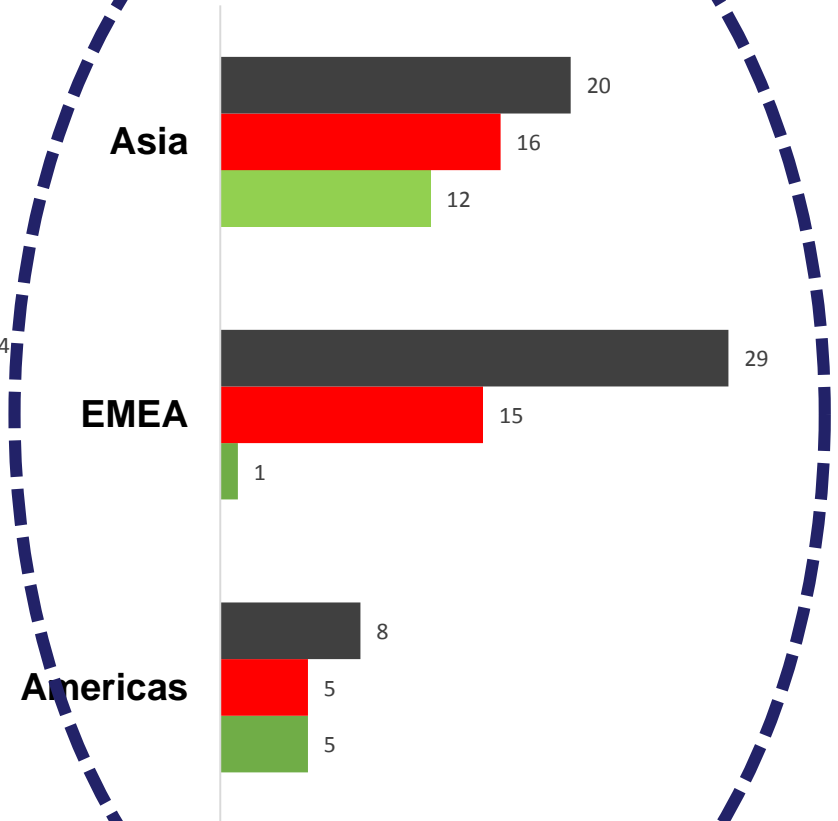
RCS Launches



VoWiFi Launches



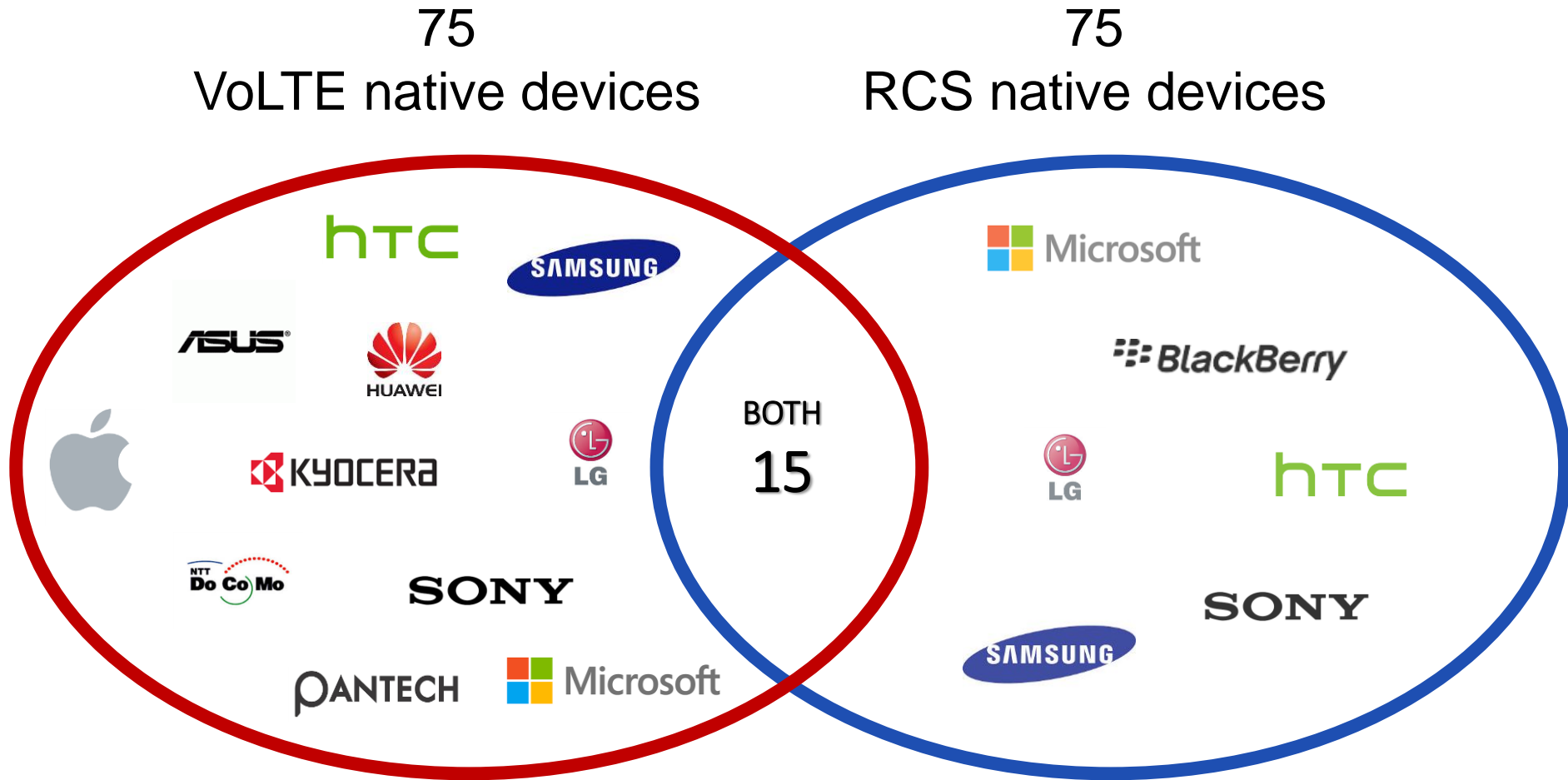
VoLTE Launches



■ FY12 /15
 ■ Up to Today
 ■ FY15/16 predictions

Native IP Communications Enabled Devices are Here!

24% of all flagship devices are natively IP enabled and increasing



But without interoperability convergence: Support burden, cost and time to market will increase.

VoLTE Interoperability Initiative

Network 2020

Towards Global Interop: Key Execution Steps



- Situation analysis
 - Analysis of IR.92 optionality and improvement areas
 - N2020 IP Comms Issues Registry database
 - Analyze Korea TTA UNI Interop spec and other commercial deployments
- Outreach and education
 - Engagement with key operators, device OEMs and infra vendors
- Problem resolution
 - NG/RiLTE VIRTUE Task Force: VoLTE Interop issues resolutions & Open Market Device (OMD) default parameters
 - TSG TAD: Device configuration parameters
- Validation
 - Lighthouse reference projects: IOT/conformance testing and commercial reference implementations to validate VIRTUE / OMD solutions
 - Additional lighthouse projects in other regions pending

VoLTE Fragmentation Sources

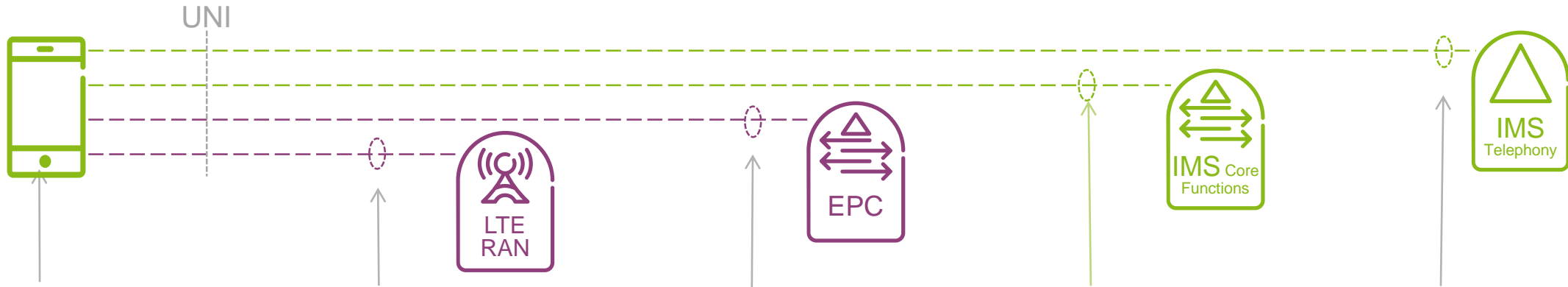


- IR.92 v9.0 spec contains optionality
 - Analysis completed by N2020/Technology team
- Variety of fragmentation sources
 - IR.92 Optionality
 - IR.92 Interpretation / lack of detail
 - IR.92 Out of scope / not covered
 - Intentional deviation (proprietary)
 - Unintentional deviation (bug)
 - Use of older spec versions
- Combinations are growing rapidly with each new launch
 - TSG TAD TS.32 device parameter configuration will help, but number of configurations will become burdensome for OEMs and dramatically increases opportunities for interop issues



Section #	Item/Heading	Options listed and suggested default
1.1	Protocol Stack	TCP / UDP transport – see also ID_002 & ID_014
2.2.1	Feature tags	SMSolP included if supported – this should be the default/preferred option.
2.2.6	SIGCOMP	May be supported on an access other than LTE. This means HSPA (IR58) – which isn't used in practice. So, this should say that SIGCOMP is never used.
2.2.7	P-Early-Media	May be supported by the UE.
2.3.2	XCAP APN	Configured or INTERNET
2.3.2	Service Config	IR92 specifies Ut but USSI also used - see also ID_137
2.3.3	Ad Hoc Conf	The IR92 text seems OK with no obvious optionality. However, there are issues with CONF – see ID_134 & ID_147.
2.3.6	OIR service config	Is optional. This can be done on the UE – so probably best to take it out?
2.3.7	TIR service config	Is optional. This can be done on the UE – so probably best to take it out?
2.4.1	Precons	IR92 states that UE must support precons and n/w may disable them. However, UEs are (in practice) affected – see ID_145 – in contradiction to IR92 text.
2.4.2.1	Application session binding	Stated implicitly in IR92. It could be more explicit. See also ID_131
2.4.3	EVS Codec	Optional support of EVS
3.2.1	EVS Codec	Optional support of EVS in place of AMR-WB
3.2.5	Speech Payload	IR92 states that the UE must support up to 12 speech frames (=240ms maxptime). However, Korea has deviated (6) and also see ID_117.
4.4	P-CSCF Discovery	IR92 is clear (i.e. address via EPS). Korea also have the IMS-MO as an option (presumably as an evolutionary step?).
5.1	IP Version	IP4 / IP6 (both must be supported)
5.2.1	Emergency Service	Emergency call via CS/IMS – and support of XML body to redirect to CS.
Annex A.1	Voice/SMS support	CS also used in addition to IMS when on legacy coverage
Annex A.4	Service Config	USSD on CS also used
Annex A.5	Emergency	Via CS network
Annex A.6	Roaming	Use of CS if no P-CSCF in VPLMN
Annex A.7	SMS	SMS over SGs
Annex A.9	USSD	Use of USSD for config on CS
Annex B.1	GTT	UE support of T.140 text media in some markets
Annex B.2	SSAC	UE support of Service Specific Access Control in some markets

Main areas of VoLTE UNI fragmentation



- Jitter buffer management
- CS coexistence functions
- IMS Voice domain preference
- **Pre-conditions on/off behavior**
- **Behavior upon receiving error codes (e.g., whether retry, re-register, fall back to CS etc)**
- **Data Off behavior**
- USSD

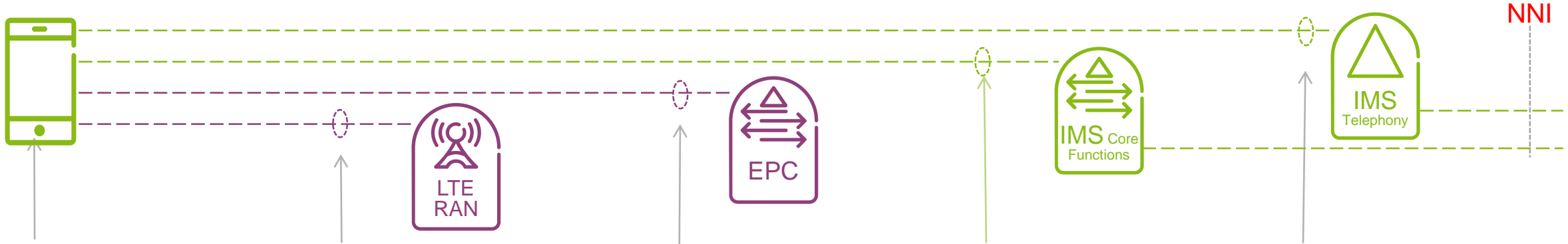
- Minimal radio profile defined
- Dedicated bearers for signaling, voice and video
- RTP header compression, RoHC
- Battery saving features
- IMS Emergency procedures

- P-CSCF Discovery
- Use of APNs for different service flows incl. **APN used for XCAP**
- Standard IMS APN
- IMS Signaling bearer profile
- **Use of dedicated bearers for voice and video**
- Handling of dynamic established bearers incl. QoS
- **Country specific IMS Emergency procedures**

- Authentication profile
- Tel-URI and SIP URI
- IPSec protection of signaling.
- **Voice and video codec profiles**
- Data transport profiles and **RTCP use**
- **Early dialogues and early media**
- Control of EPS bearers and **use of pre-conditions**
- SRVCC support
- **Country specific IMS Emergency procedures**
- SIP Timers
- SIP Transport / Fragmentation

- Basic profile of MMTel Supplementary Services
 - OIP, OIR, TIP, TIR
 - CDIV (CFU, CFNL, CFB, CFNRc, CFNR)
 - CB (ICB, OCB, ICB-R, OCB-IC)
 - MWI
 - **Comm. Waiting**
 - HOLD
 - **Conference**
- SRVCC support
- ICS/T-ADS support
- **Procedures for service management using XCAP/Ut and SIP *# codes**

VoLTE UNI fragmentation **impacting NNI**



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S. Korea TTA Standard: VoLTE UICC Portability Spec

Successful Interoperable Market Launch



- Korean MNOs achieved full commercial UNI interoperability
 - Spec developed by TTA and 3 Korean operators
 - Delivers full UICC (SIM card) portability for regulatory compliance
 - Reference example of successful commercial VoLTE/ViLTE device interop and interconnect; however spec deviates from IR.92 so not suitable for OMD reference template:


- Use of the SIP USER-AGENT header to convey phone model and operator id.
- IMS encryption seems not to be used (sect 5.2.2)
- They specify local/national numbers to be used,
- Use of the "require:explicit" param in the ACCEPT-CONTACT header
- Text in 5.2.4 about sending a re-INVITE if an SDP answer contains a zero port number for the video stream (the extra message seems superfluous)
- List of MMTEL services is modified by some extra ones (e.g. CAT). Also Communication Waiting is in R2 and wasn't in the original version.
- Specified UE behaviour for IOP (replacing +82 by 0 for display purposes)
- Specify use of HISTORY-INFO header in more detail than IR92 for Communication Forwarding
- Adds words on CALL HOLD if hold request rejected (although this should be in 24.610?)
- TTA doc specifies SDP content for voice and video in more detail than IR92
- TTA doc specifies the CANDIDATE-ATTRIBUTE param (RFC 5245) to enable the UE IP address to be conveyed (in case of NAT/ALG)
- TTA doc specifies use of IMS MO and an extension TTA VoLTE MO with defined params
- TTA doc specifies RTP/RTCP inactivity timers to be used by UE
- TTA doc diverges from IR 92 in that only 6 speech frames can be included in RTP packet (in place of 12 – i.e. maxptime = 120)
- Extra details on video codec included
- Extra details on DTMF events included
- P-CSCF address can be obtained via DM Server or EPC (in that order) in TTA doc, IR92 specifies the latter.
- TTA doc specifies emergency URNs to be used in Korea
- SMS is done either via IP or SGs – and determined by data setting
- TTA doc specifies OMA MMS
- Appendix II of TTA doc provides SDP examples. Open offers are used.

TTA Standard

정보통신단체표준(국문표준)
TTAK.KO-06.0357/R2 개정일: 2015년 6월 23일

사업자 간 UICC 이동성 제공을
위한 VoLTE 단말 규격

Specification of VoLTE Terminal for UICC
Portability between Mobile Operators

 한국정보통신기술협회
Telecommunications Technology Association

VoLTE Interop Issue Resolution Paths



Current formal resolution paths:

- IP Comms Issues Registry: <http://www.gsma.com/network2020/ip-communications-issues-registry/>
- VIRTUE: Bug fix/ CR to IR.92 and other relevant PRDs
 - The VoLTE Interoperability Resolution Expediting task force (subgroup of NG/RiLTE) is tasked to perform an analysis of issues related to VoLTE interoperability that are submitted either directly to RILTE or in the IP Communications Issues Registry maintained by the GSMA. GSMA infocenter: <https://infocentre2.gsma.com/gp/wg/IR/RIL/VIR/Pages/Default.aspx>
- TSG TAD: TS.32 device parameter configuration for existing fragmentation

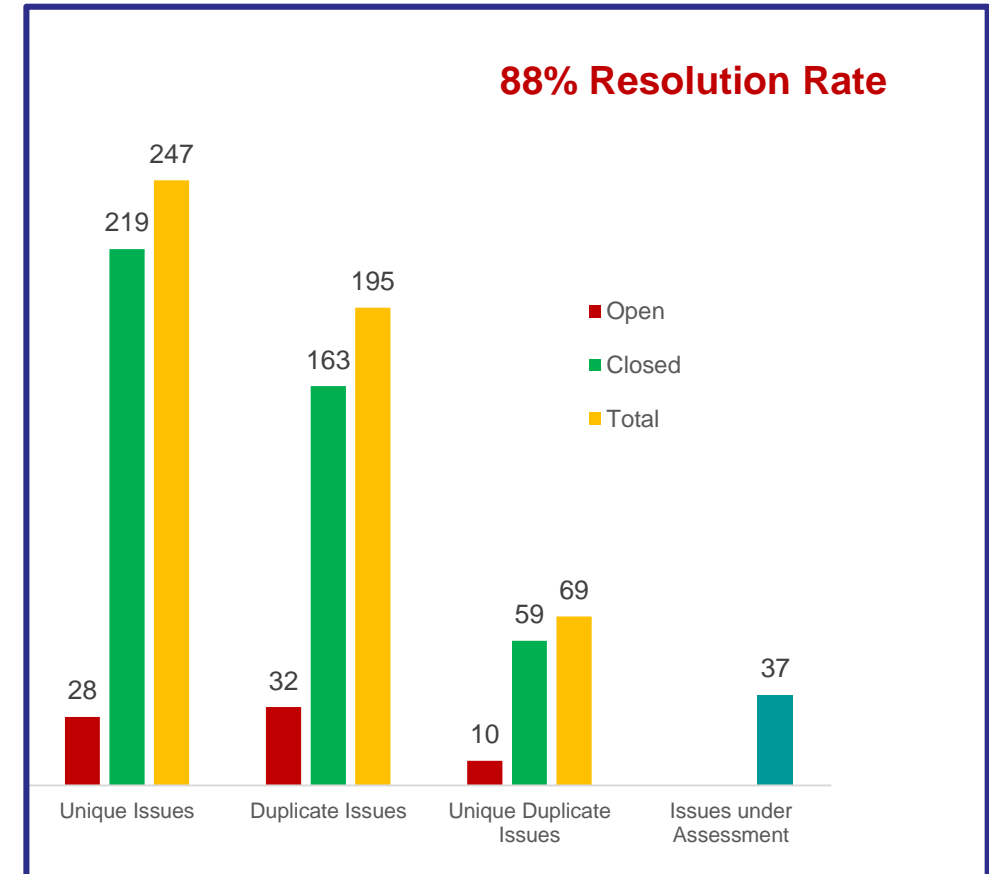
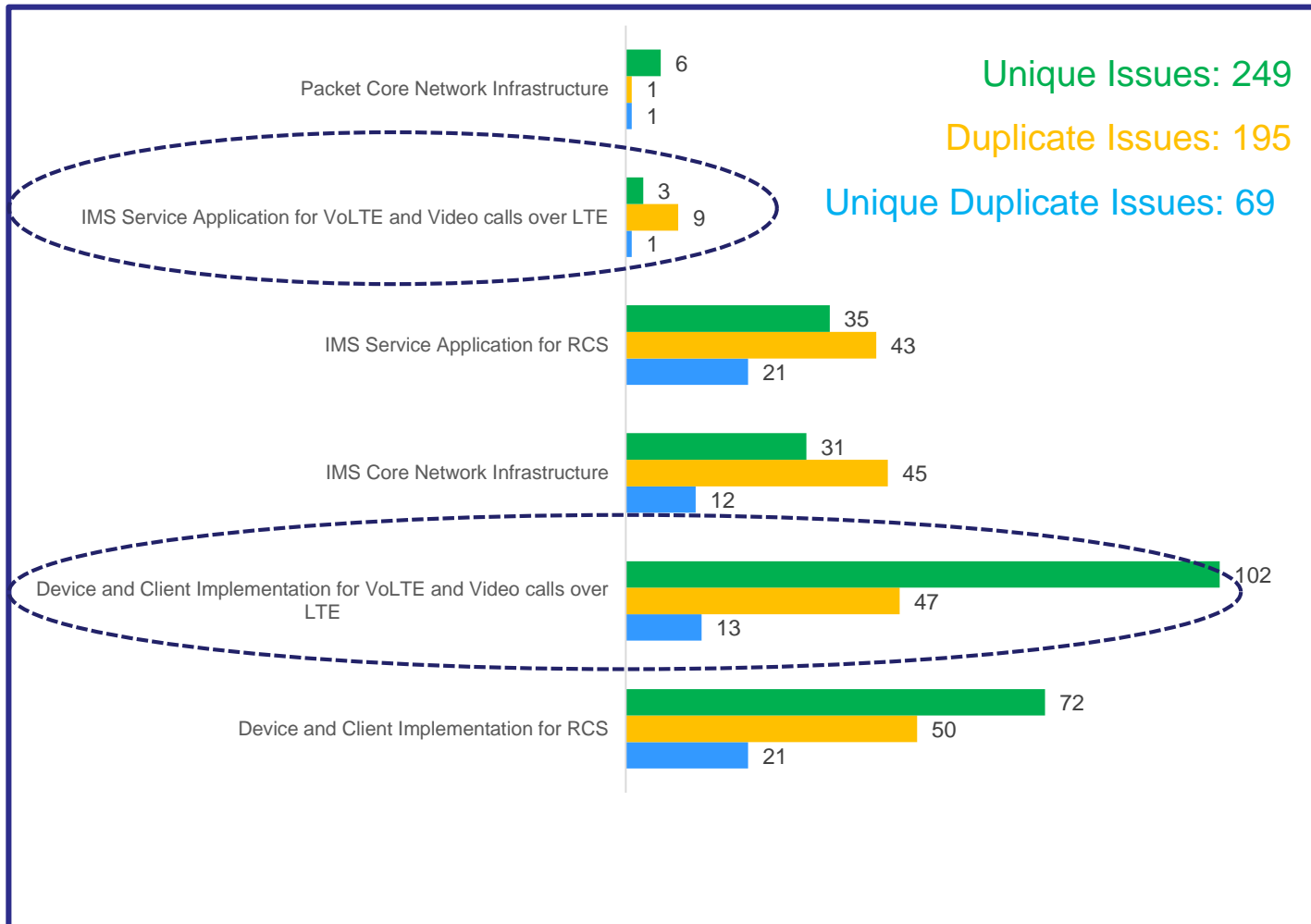
Additional initiatives:

- Accelerate collection of lessons learned and existing issues
- Create Implementation Guidelines for Open Market Devices
- Test specs and testing events & facilities

GSMA N2020 IP Comms Issues Registry (AKA IP SSR)



<http://www.gsma.com/network2020/ip-communications-issues-registry/>



As of November 2015

■ Issues Resolution

- Solved 28 interop issues
 - 7 resulted in action in NG (RiLTE or Packet), e.g. a CR to IR.92 or other PRD, or LS
 - Currently 12 open issues
 - Will continue to solve issues in the N2020 Issues Registry and to address any issues brought directly to the TF
- Immediate target is a stable IR.92 v10.0, to be approved by NG #3

■ Device Configuration

- VoLTE/VoWiFi parameter list developed and being sent to RiLTE #49 for approval; then on to TSG/TAD for inclusion in their PRD TS.32 on Late Customisation
- Currently 26 configuration parameters; default settings are being chosen for Open Market Devices where possible
- Recommended VoLTE Configuration Method needed: RiLTE is now convening a meeting series on the topic

China Lighthouse VoLTE Reference Project



■ Goals

- Define common VoLTE UNI/NNI implementation guide for 3 China operators to reduce device interoperability issues during VoLTE deployment, and provide input to global Open Market Device UNI/NNI profile
- Conformance/interoperability test event(s) to verify VIRTUE resolutions and Open Market Device profile
- Demo China profile / Open Market Devices in at MWC 2016
- OMD is a key success factor: Target at last one OMD supporting this profile in market by June 2016
- Serve as a reference implementation

■ Participation

- China Mobile, China Telecom, China Unicom, CAITC and industry leading vendors across infrastructure, devices, IC vendors, and test equipment

■ Implementation Guideline Documentation

- Complementary to IR.92/94: Endorsement and device parameter selections plus more detail to clarify UNI/NNI implementation
- Input to GSMA recommended global Open Market Device VoLTE profile
- Complete by Feb/Mar 2016 (Drafted by Dec 2015)

- GSMA is actively facilitating VoLTE/ViLTE/VoWiFi interoperability & convergence
 - Improvements to IR.92 spec and other PRD specs
 - Development of test specs and potential test events
 - Issues registry and implementation guidelines
 - “Lighthouse” reference implementations (e.g. China Task VoLTE Force and Germany RCS Interconnect)

- Please Contribute!
 - N2020 IP Comms Issues registry
 - NG/RiLTE/VIRTUE

- Utilize GSMA Network 2020 Resources:
 - Issues Registry: <http://www.gsma.com/network2020/ip-communications-issues-registry/>
 - Technical resources (Q&A)
 - VIRUTE: <https://infocentre2.gsma.com/gp/wg/IR/RIL/VIR/Pages/Default.aspx>



Thank you