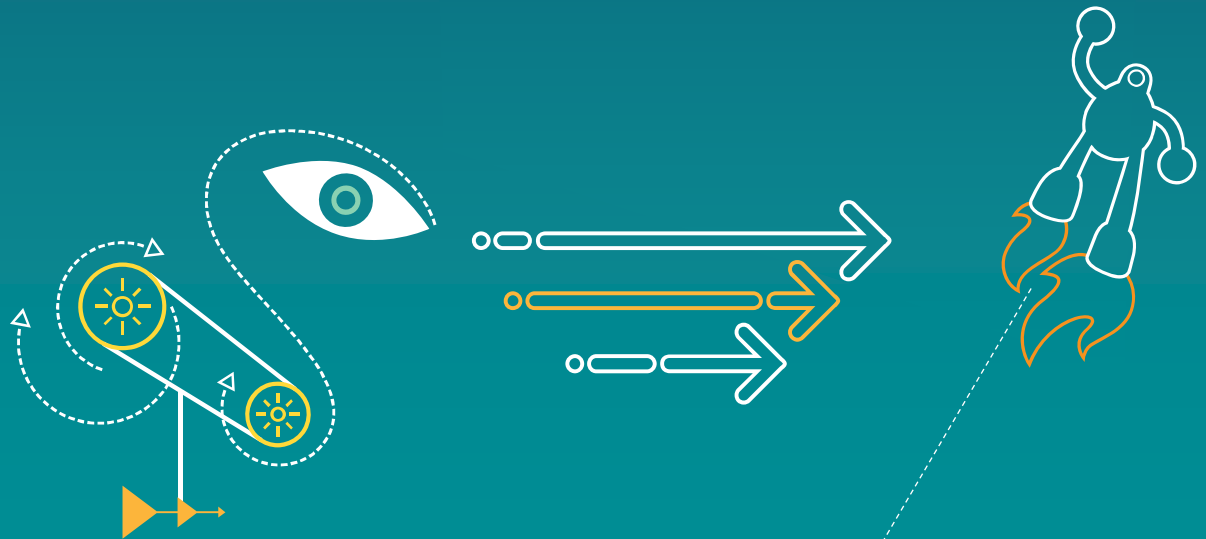


David Williams

Next Generation eCall

QUALCOMM®



Background

- eCall standardisation began in 2004
 - A GSM & UMTS world
 - The chosen solution was in-band modem and circuit switched 112 call
 - The in-band modem was optimised for circuit switched GSM and UMTS.
- eCall for LTE standardisation was started in 2013
 - There is no circuit switched in LTE
 - IMS emergency call will replace circuit switched emergency call.
- Need for long term thinking
 - Motor vehicles last longer than phones
 - PSAPs investments must be protected
 - GSM and UMTS spectrum is being re-farmed for LTE
 - 5G is coming

eCall options for packet switched networks

- In-band modem on VoIP
 - De-jitter techniques in packet switched networks affect performance
 - Loss of audio path (muting)
 - Not a good base case but useful as back up in some scenarios
- Over the top data
 - No priority or QoS. Data not associated with voice.
 - Data service has to be enabled on the phone
 - MNO can't route to most appropriate PSAP
- Short Message Service (SMS)
 - Data not associated with voice
 - Roaming scenarios are complicated
 - SMS to 112 not supported in some countries
- IP Multimedia Service (IMS)
 - Supported in 3G (PS), 4G and 5G
 - IMS emergency call can carry data with the signalling
 - Integrated voice and data, emergency prioritization, & high



- First Generation eCall is based on Circuit Switched emergency call and in-band modem
 - “CS eCall”
- Next Generation eCall is based on IMS emergency call
 - “NG eCall”

Why not go straight for NG eCall?

- The eCall deployment deadline is March 2018.
- IMS emergency call is unlikely to be deployed everywhere in Europe by 2018.
- NG eCall needs a network support indicator which is in 3GPP Release-14.
- Some countries are now ready for CS eCall.
- CS eCall can co-exist with, and migrate to, NG eCall.
- Majority of PSAPs will not be NG eCall ready by 2018.
 - NG eCall to a CS only PSAP will provide the worst

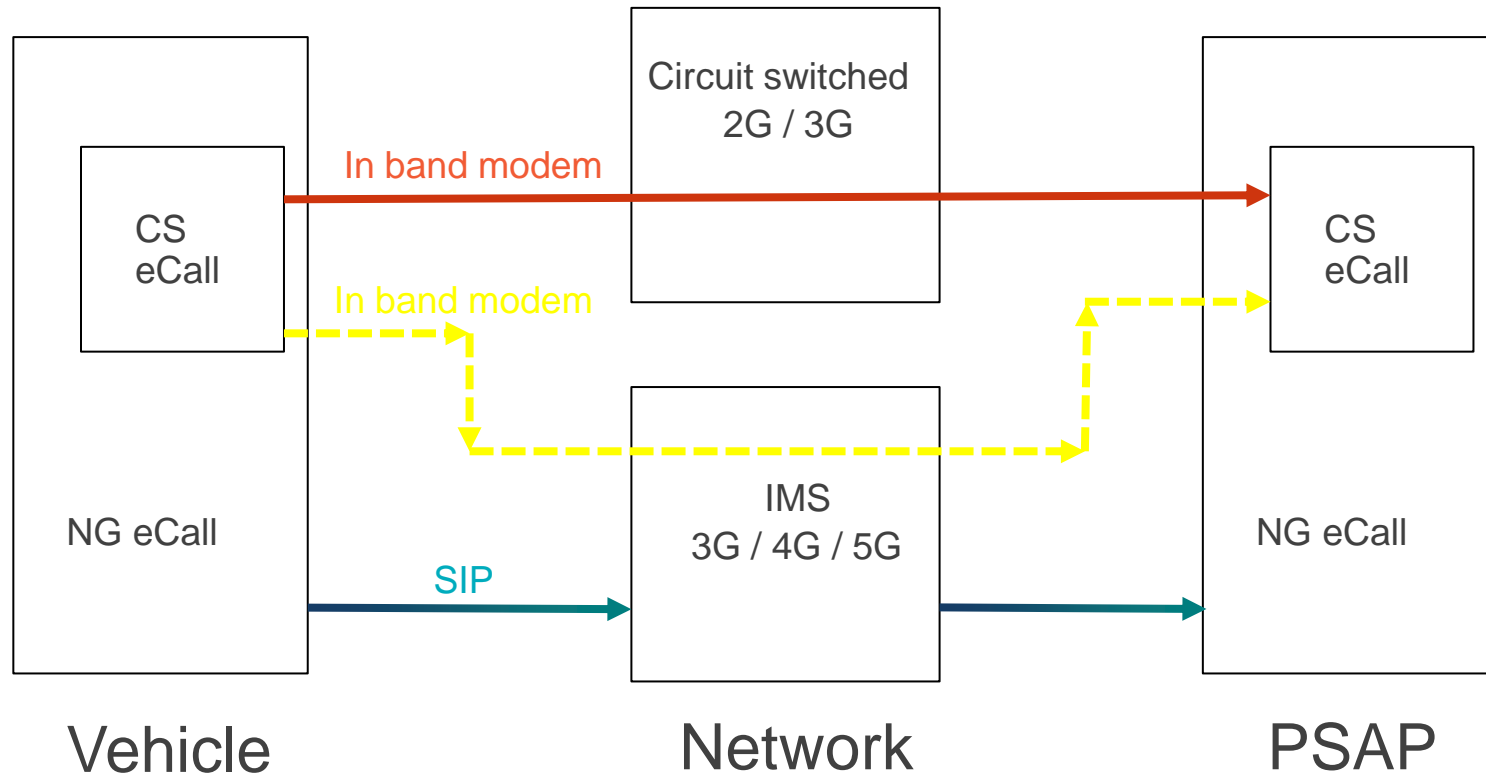
NG eCall key features




- Based on IMS emergency call, and SIP server in the PSAP
- Routing to PSAP based on Uniform Resource Names (URN)
 - urn:service:sos.ecall.manual for manual eCall
 - urn:service:sos.ecall.automatic for automatic eCall
 - urn:service:test.sos.ecall for test eCall
- Initial Minimum Set of Data (MSD) is sent in SIP INVITE
- MSD is acknowledged in the INVITE response
- A new MSD can be requested by the PSAP using SIP INFO

Co-existence of NG eCall with CS eCall

- Vehicles supporting NG eCall shall also support CS eCall
- PSAPs supporting NG eCall shall also support CS eCall
- The network shall have an NG eCall support indicator
 - Shows if the network supports NG eCall and there is an NG eCall capable PSAP
 - If the indicator is present, the vehicle does first attempt NG eCall
 - If the indicator is not present, the vehicle does first attempt CS eCall

Co-existence of NG eCall and CS eCall



-  NG eCall supported in network and PSAP
-  NG eCall not supported in network or PSAP
-  Circuit switched network not available

NG eCall Standardization Status

- ETSI / 3GPP

- TR 103 140 recommends to use 3GPP and IETF for eCall – published in 2014
- Emergency call requirements for IMS – stable
- IMS eCall requirements and migration from CS eCall – stable

- IETF

- “eCall’ RFC—publication soon
 - Focuses on next generation eCall specific needs for the EU
 - Carries data and metadata/control objects per ‘additional-data’ mechanism
 - Metadata/control (ack, retransmission, requests to vehicle, etc.)
- additional-data’ specification (RFC 7852) - published
 - Transmit any registered data block with emergency call

- CEN

- eCall over IMS (TC278 WG15, PT1506) – draft available, approval expected Q1 2017
- eCall to other classes of user (PT1507) – started
- eCall over a common telematics platform (PT1508) – started

Additional possibilities in NG eCall

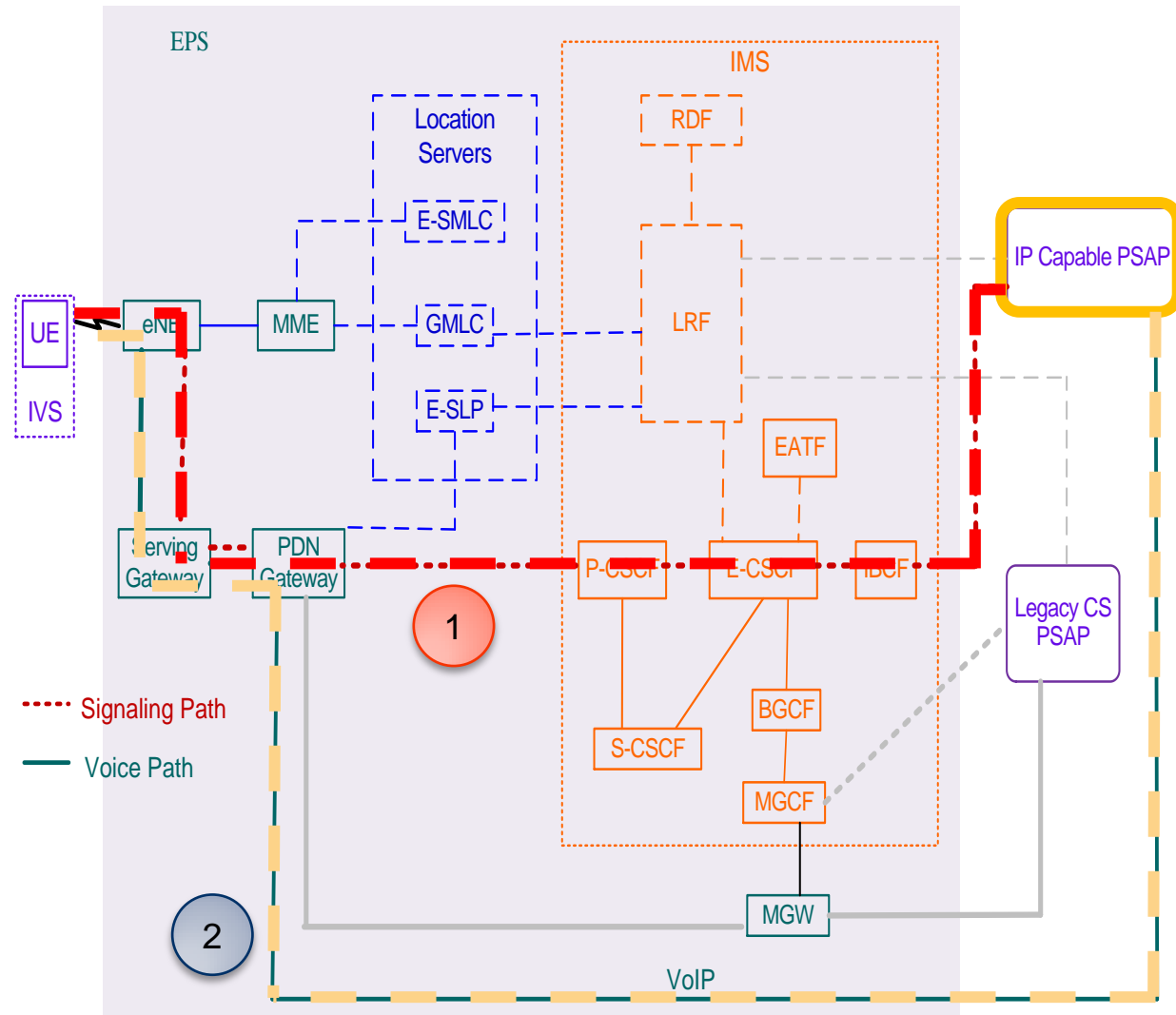
- Pictures and video sent to the PSAP
 - More data, e.g. information from nearby cars
 - Telemetry, e.g. PSAP to flash lights and sound horn
-
- None of the above are required by current regulation

Considerations for numbering

- NG eCall will use the mechanisms IMS emergency call (e.g. resolving domain names to IP addresses or SIP addresses).
- NG eCall PSAP needs a number or IP address to call back to.
- CS eCall PSAP needs a number to call back to.

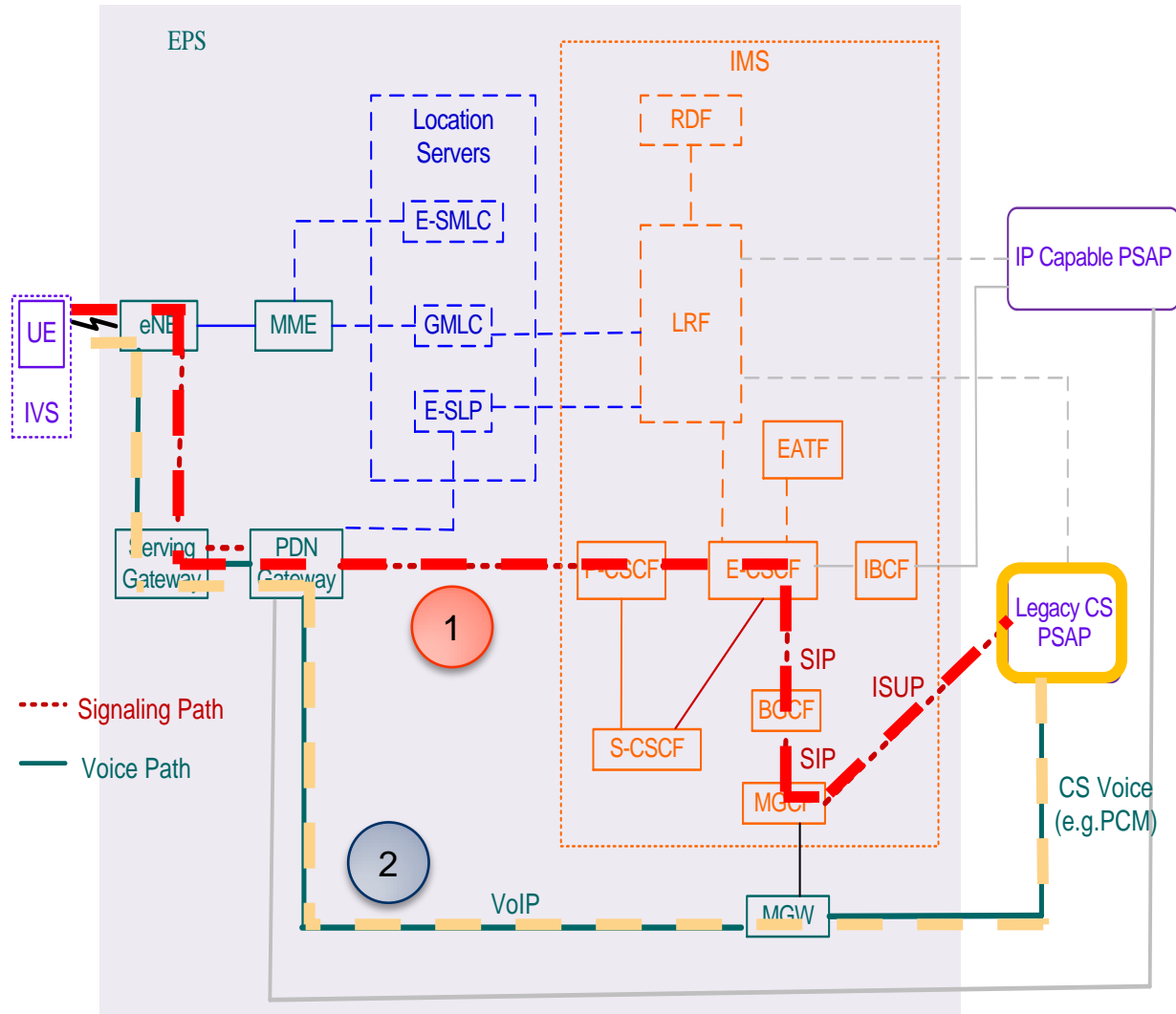
4G Architecture for NG eCall with an IMS capable PSAP (IMS eCall broadcast indicator = 1)

- The signaling path rather than voice path is used to transfer the MSD from the IVS to the PSAP
- Initial MSD can be transferred during call setup procedure and an updated MSD can be transferred during an eCall



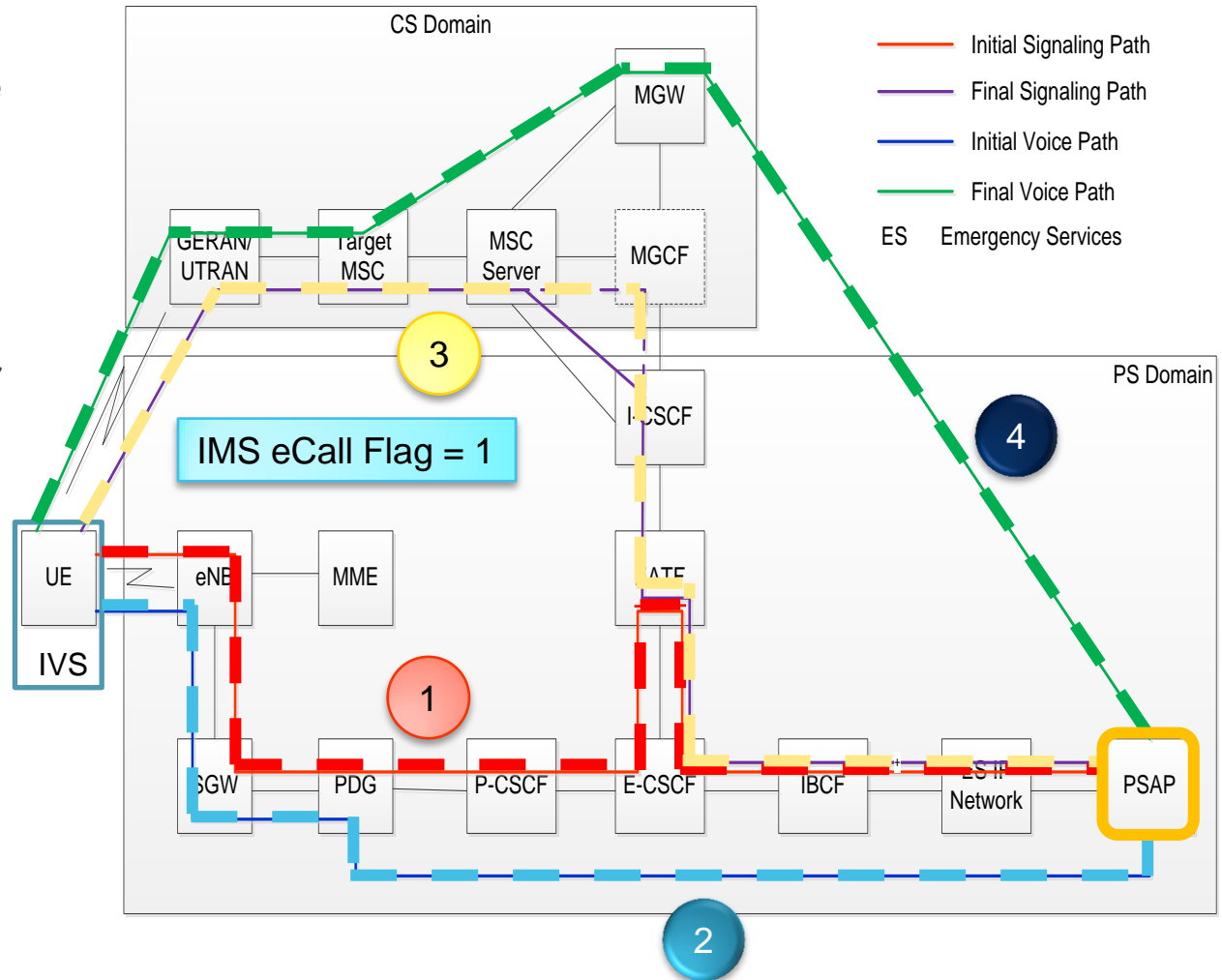
4G Architecture for NG eCall with a legacy CS capable PSAP (IMS eCall broadcast = 0)

- The MSD cannot be transferred using the signaling path
- The MSD is transferred over the voice path using the same data modem as for CS eCall in Rel-13
- The transcoding from VoIP to CS voice at the MGW can degrade in-band MSD transfer reliability and increase delay and is a solution of last resort



Handover of an NG eCall from LTE to CS with an IMS PSAP

- After handover any updated MSD must be transferred in-band from the IVS to the PSAP
- The PSAP will be aware of the handover and has to switch to in-band mode after the handover



What do stakeholders have to do for NG eCall?

- **Vehicle manufacturers**

- Install both NG eCall and CS eCall on new vehicles. As soon as possible (cars last 20 years).

- **Mobile network operators**

- Set up networks to act upon URNs and route eCalls to NG PSAPs according to location.
 - Set up NG eCall support indicator so that the vehicle behaves correctly.

- **PSAPs**

- Upgrade to NG eCall, including a SIP server.
 - Continue supporting CS eCall (for older vehicles)

EU eCall Regulations

- Does NG eCall comply?

- What are the eCall regulations in the EU?

- Require countries to upgrade their PSAPs and accept eCalls by 1 Oct 2017

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.164.01.0006.01.ENG&toc=OJ:L:2014:164:TOC

- Require eCall for new vehicle type approvals from 31 March 2018

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2015.123.01.0077.01.ENG

- Recommend that mobile network operators implement the eCall flag

http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2011/c_2011_6269_en.pdf

- Does NG eCall fit the EU regulations?

- NG eCall will be a European standard (CEN and ETSI)
- NG eCall does everything that regulation requires (voice, MSD, callback)
- NG eCall meets the requirements better; low MSD transfer delay, more reliable MSD transfer, no voice muting
- NG eCall will still work when 2G and 3G networks close down

But

- The recommendation to mobile network operators does not currently extend to URNs
- Additional features may be prohibited

Conclusion

- Deploy CS eCall now
- Start preparing for NG eCall (eCall on IMS)

David Williams
Qualcomm UK
dwilliams@qti.qualcomm.com

Thank you

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Key Abbreviations

- LTE = long term evolution
- IVS = In vehicle System
- CS = Circuit Switched
- PS = Packet Switched
- VoIP = Voice over Internet Protocol
- SIP = Session Initiation Protocol
- MGW = Media GateWay
- MSD = Minimum Set of Data
- PSAP = Public Service Answering Point
- URN = Uniform Resource Name
- USIM = Universal Subscriber Identity Module
- IETF = Internet Engineering Task Force
- 3GPP = Third Generation Partnership Project
- CEN = Comité European de Normalisation
- ETSI European Telecom Standards Institute