Input to the Technical Advisory Board for First Responder Interoperability (Interoperability Board) Workshop

Panel 2

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Summary of Recommendations p1

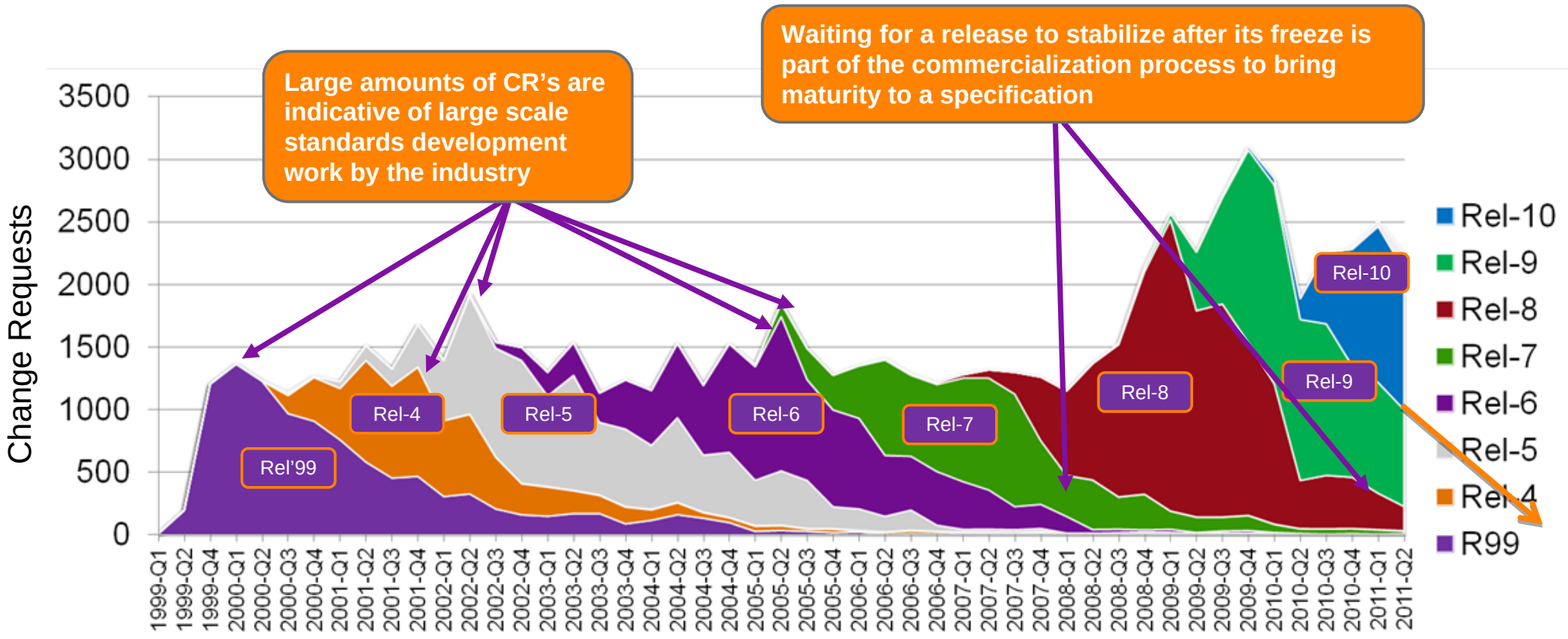
Area	Recommendation
3GPP Baseline	3GPP Rel-8 now widely deployed and commercially proven. Good baseline for initial compliance for elements and devices in wireless core of network. 3GPP Rel-9 brings important features related to Commercial Mobile Alert System (CMAS), Network Assisted Location support (OTDOA) , End-2-End emergency call support, & Initial Multimedia Broadcasting Service (MBMS) Support. 3GPP Rel-10 adds building blocks for LTE-Advanced (MIMO enhancements, etc), Relays, Minimizing Drive tests, SON etc is not expected to be commercially deployed for some time due to recent completion by 3GPP in March 2011. 3GPP Rel-11 is still undergoing standardization with earliest completion by Dec 2012. Recommendation: Based on expectations for commercial implementations in coming 12-18 months, 3GPP Rel-9 (March 2010 + critical CR's) features bring useful functions for FirstNet to use as a starting point for the network. Following commercial deployments as the precursor for use in FirstNet for major system releases and complex features reduces risk and stability issues for Public Safety. Being an early technology adopter creates costs and stability issues which should be avoided by FirstNet. Specific features can be cherry picked if critical for Public Safety use ahead of commercial deployments for exceptional needs.
3GPP interfaces for Interoperability	In general the 3GPP interfaces should be interoperable within the PS network. The actual definition of interoperability should be specified based on vendor and customer requirements and not on a blind compliance to specifications. Specifications have many features and options but market demand for features drives real world implementation by industry. Recommend that interfaces be open based on 3GPP specifications, but specifics of functions and features need to be collaboratively agreed by FirstNet and equipment manufacturers based on widely deployed commercial features and selected deltas needed for Public Safety use. Use of network element grouping into subsystems can optimize testing complexity.

Third Generation Partnership Project “3GPP” LTE Release Timeline

Rel-8	Rel-9	Rel-10	Rel-11
Introduction of LTE SAE “All-IP”	Regulatory Voice MBMS Positioning PWS	**Carrier Aggregation** **DL & UL MIMO** **Relays** **SON** **Minimizing Drive Tests**	CA Enhancements Carrier based HetNet ICIC CoMP
Completed 03/09	Completed 03/10	Completed 06/11	estimated 12/12

Source: 3GPP 2011-06

3GPP Release Stability Over Time

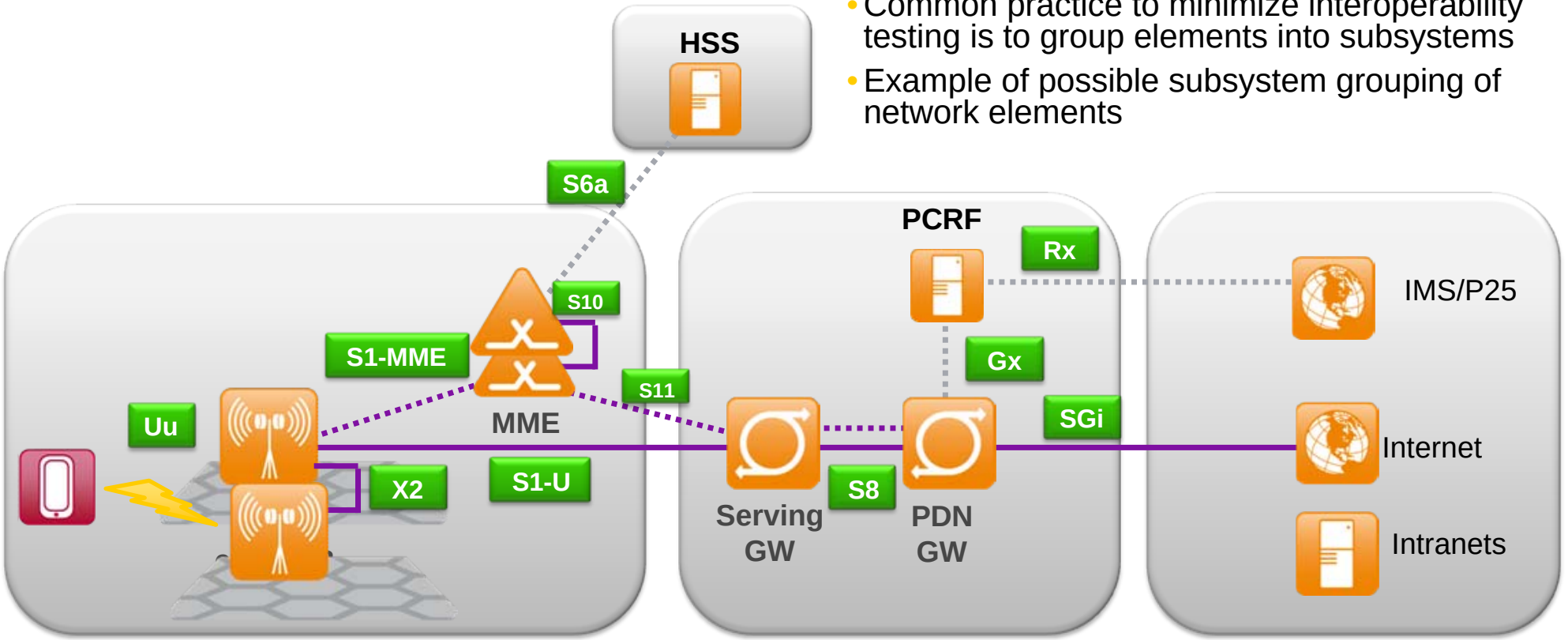


- CR rates give a good indication of the stability of specifications
- A sharp rise in CR's in the early stages shows healthy industry standards development

Source: 3GPP 2011-06

Interoperable interfaces and subsystems

- 3GPP LTE Interfaces are open in design
- Common practice to minimize interoperability testing is to group elements into subsystems
- Example of possible subsystem grouping of network elements

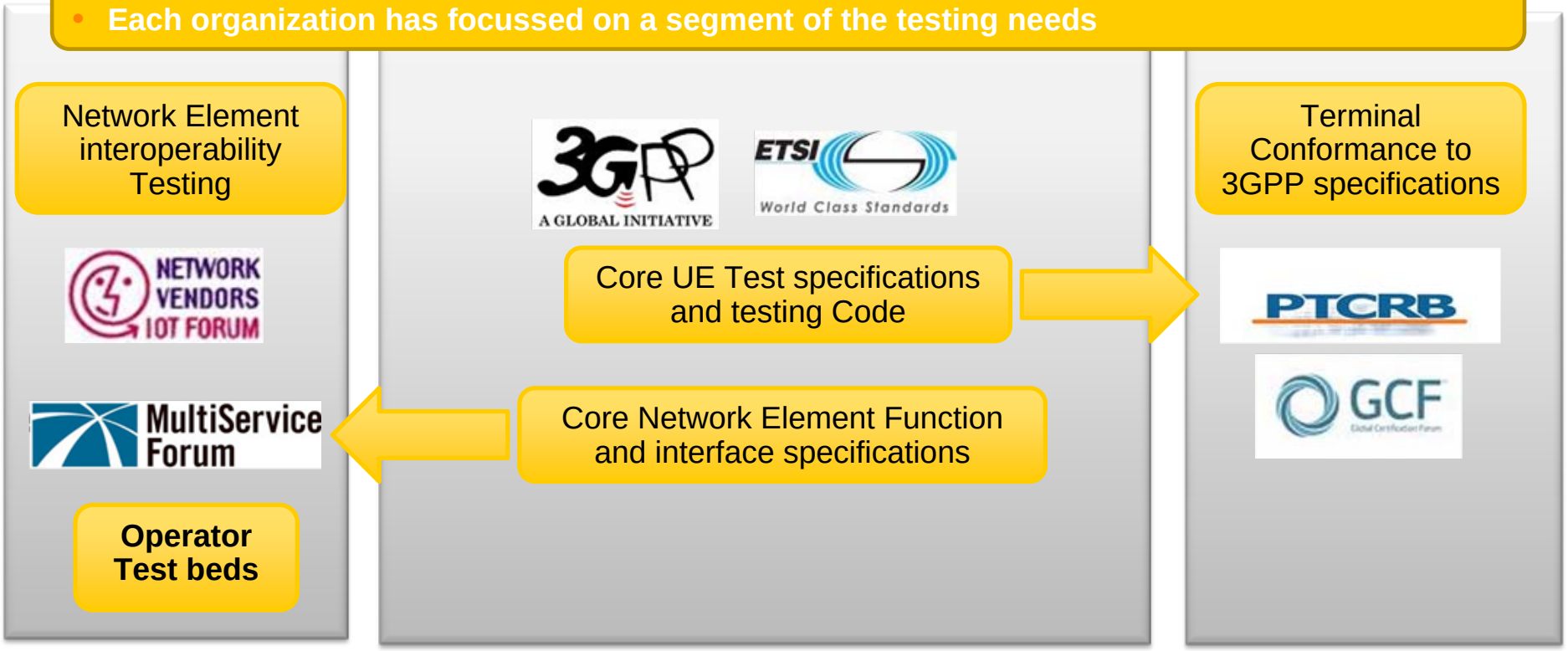


Summary of Recommendations p2

Topic	Recommendation
Standards Bodies	Any commercial wireless network depends on multiple standards to have a open and interoperable network. The main bodies for reference are 3GPP for LTE Radio Access and Core network including specific services such as SMS, Telephony. OMA (Open Mobile Alliance) for Device Management, Multimedia Messaging (MMS), SUPL User plane Location, etc, IETF for protocols. Additionally there are specifications in ATIS (3GPP Operational Partner) for like CMAS, Numbering, etc., and GSM Association (GSMA) for VoLTE, Rich Call Services, Roaming which are applicable for FirstNet. Recommendation: 3GPP standards are main basis for network as a transport layer with SMS, VoLTE OMA for MMS and Device Management, IETF for IPv4/V6 and protocols used by applications/services, ATIS for CMAS, PLMN-IDs, PSAP interworking, GSMA for VoLTE, RCS Profile, Roaming guidelines, TIA with ATIS for P25 interworking.
New and Novel features	New or novel features specific to Public Safety need to be brought to a recognized standards development organization (SDO) to allow all manufacturers to develop.
Evolution of network and maintaining compatibility	3GPP Releases include backwards compatibility as part of standardization which allows for easier upgrades of releases. Common practice is to test software loads and system releases first in lab and then small field trial before rolling out over network. In order to ensure common feature sets and roadmap availability between vendors and subsystems of network operators work with vendors yearly to create forward looking requirement documents to ensure synchronized development LTE vendors conduct bilateral testing of interfaces with software load revisions through NVIOT (Network Vendors Interoperability Testing) forum. Recommendation: Coordinate stakeholders in Public Safety Network to have a clear roadmap of features to ensure network can be upgraded nationally across vendors and subsystems. Follow commercial deployments of 3GPP system features and release to minimize testing learning curve. Recommend that FirstNet develops in-house testing capability, or outsources to qualified 3rd party, or include interoperability testing as part of technology acquisition efforts.

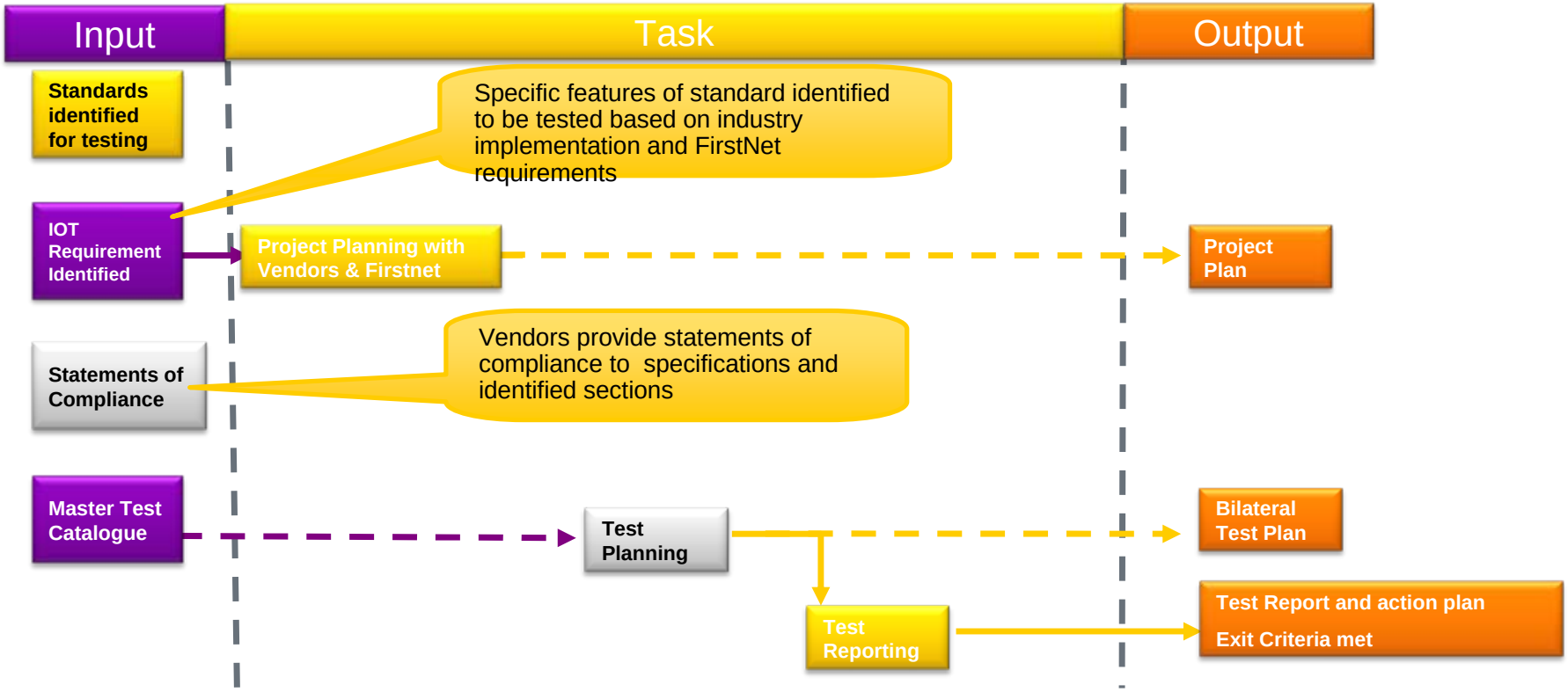
Wireless Testing Ecosystem

- **Multiple industry fora involved in addition to Vendor and Operator testing / trialling**
- **Each organization has focussed on a segment of the testing needs**



Interoperability Testing is a multi-stakeholder environment

Testing for interoperability



Testing 100% of any specification is unrealistic and wasteful. Understand common vendor roadmaps, agree needed features with deltas, then test.

Summary of Recommendations p3

Topic	Recommendation
IPv4/IPv6	The benefit of launching with IPv6 is that public safety can take advantage of a one-time opportunity to plan its IP address space with IPv6. The minimum approach is to start with a dual stack IPv6/IPv4 network and migrate operations fully to IPv6 over time. The benefit to this approach is that early phase IPv6 planning and introduction is completed at the start of the network, which greatly simplifies the issues of introducing a new IP version addressing scheme at a later time. Recommendation: Dual-stack IPv4/IPv6 as a pragmatic way to enable transition mechanism from IPv4 to IPv6.
GTP vs PMIP on S5	3GPP specified two protocol options between S-GW and P-GW. Wide commercial deployment of GTP in GSM and WCDMA networks and new LTE networks. Recommendation: S5 interface used with GTP as mandatory interface protocol. Also means that additional Gxc interface from PCRF is not needed to S-GW.
System Identifiers	A single National PLMN ID allows public safety users can move freely throughout the nation. Use of a second PLMN would allow for secondary users (utilities, etc) to have access to the network. • Non public safety users can be hosted in logically and even physically separate network elements (eNB/Radio resource shared between Public Safety and Non Public Safety users) • Demarcation between Public Safety and Non Public Safety user equipments can provide advantages in operating the network • Separate QoS treatment can be implemented for Public Safety and Non Public Safety users across transport and Core Network Separate PLMN ID for Public Safety Network and Non Public Safety Network using the Multi Operator Core Network functionality (MOCN)functionality on eNB will also ensure MSIN space for explosive growth in emerging devices- such as camera's on emergency responders vehicles, bullet proof vests, traffic lights, heart rate monitors etc. Recommendation: Use a single national PLMN ID for Public Safety users. Have a 2nd PLMN ID enabled by 3GPP Multi Operator Core Network functionality (MOCN).

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