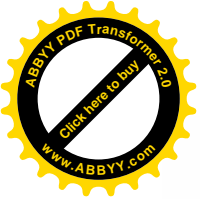


Core Network migration towards the Evolved Packet Core, status and future 3GPP work

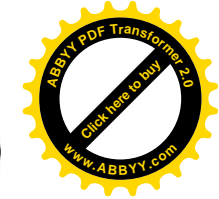
Mr Atle Monrad
Chairman of 3GPP TSG CT





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Outline



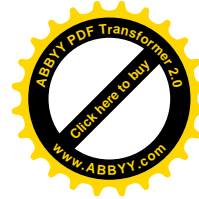
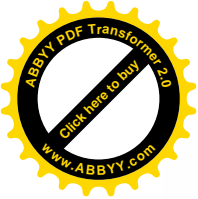
 3GPP Core Network, Rel-8 – Rel-10

 Network optimised for IP traffic

 Voice over both CS and PS

 Future plans, Rel-11 and beyond



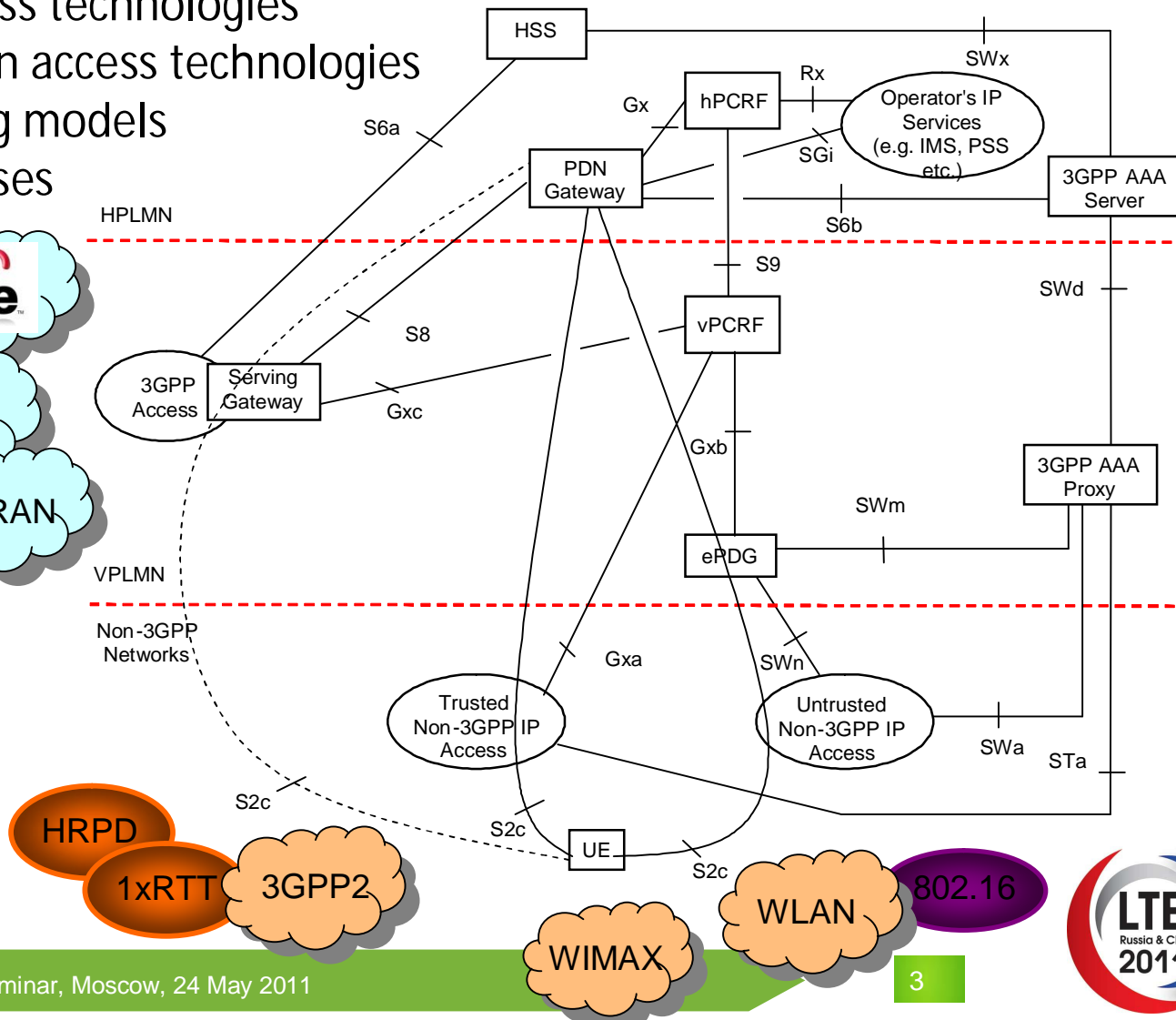
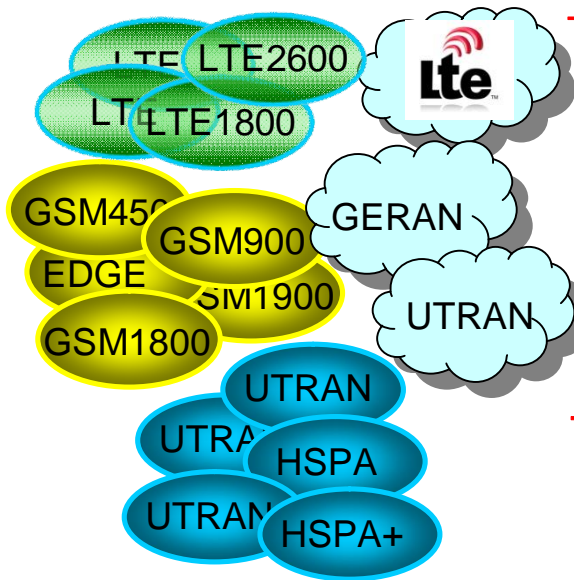


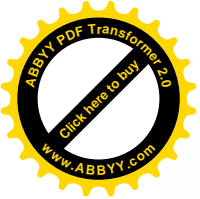
EPS architecture



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- Many 3GPP access technologies
- Mobility between access technologies
- Multiple roaming models
- Non-3GPP accesses





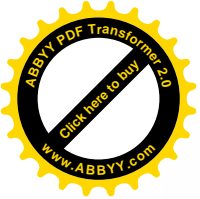
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EPS Core Network key-points



- ❖ Flat Packet Switch (PS) only architecture, two network nodes for control plane
- ❖ Security mechanisms to facilitate various traffic cases
- ❖ GTP and PMIP roaming interfaces (S5/S8)
- ❖ Optimised interworking with legacy cellular systems
- ❖ Various ways to combine or split traffic off at various points
- ❖ Advanced policy-functions in network as well as in terminals
- ❖ Interworking with non-3GPP access technologies
- ❖ Facilitate mobile as well as fixed networks










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Network optimised for IP traffic



-  Dual-stack IPv4/6 connectivity
-  Terminals as well as network can influence the QoS
-  Operators can influence the selection of access by ANDSF
-  Various ways to combine or split traffic off at various points
 - Local IP Access (LIPA)
 - Selective IP Traffic Offloading (SIPTO)
 - WLAN offloading
 - Multiple PDN Connections to Same APN (MUPSAP)

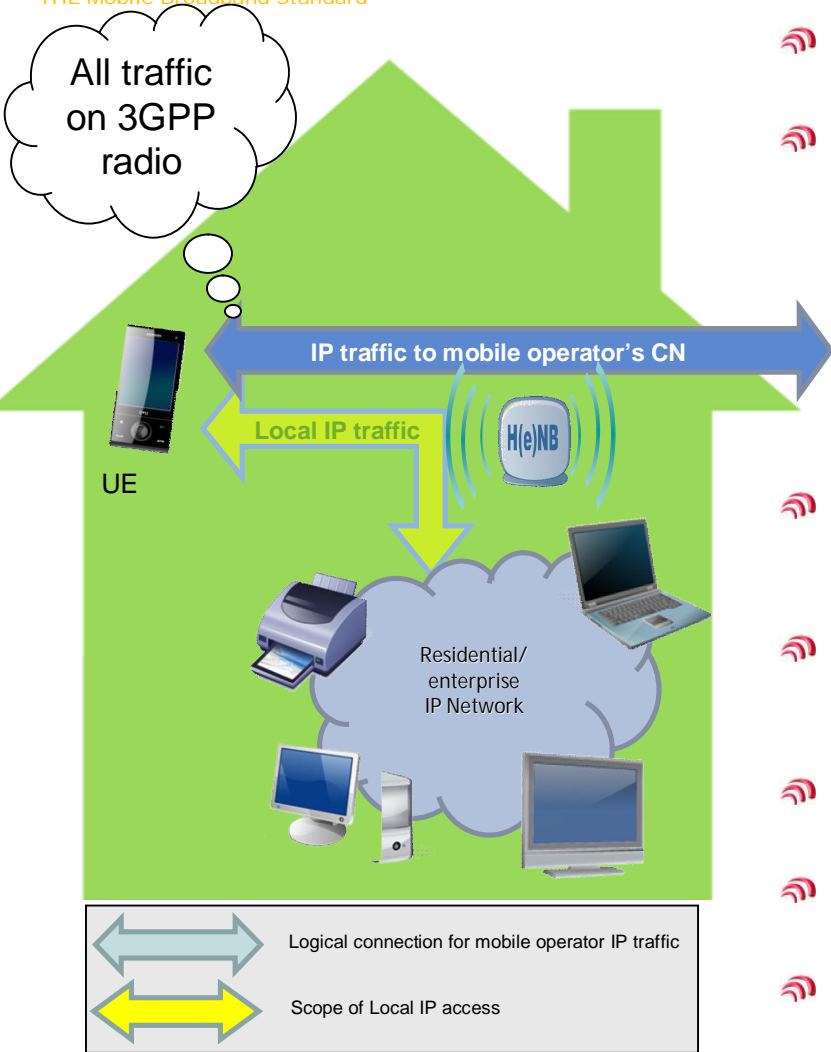
-  CS traffic is still supported ...





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Local IP Access (LIPA)



- LIPA is primarily for end user's benefit, to allow access to local residential or corporate network through a 3GPP device
- LIPA service does not need to be transparent, but the end user may have to "select" LIPA access

- LIPA provides access for IP capable UEs that are connected via a H(e)NB subsystem (i.e. using H(e)NB radio access) to other IP capable entities in the same residential/enterprise IP network.
- Simultaneous access from a UE to the mobile operator's core network and Local IP Access to a residential/enterprise IP network will be supported.
- A UE must have a valid subscription with the mobile operator in order to use Local IP Access.
- A UE must be able to use Local IP Access in a visited network subject to roaming agreement between mobile operators.
- Pre-Rel 10 UEs should be able to use Local IP Access.



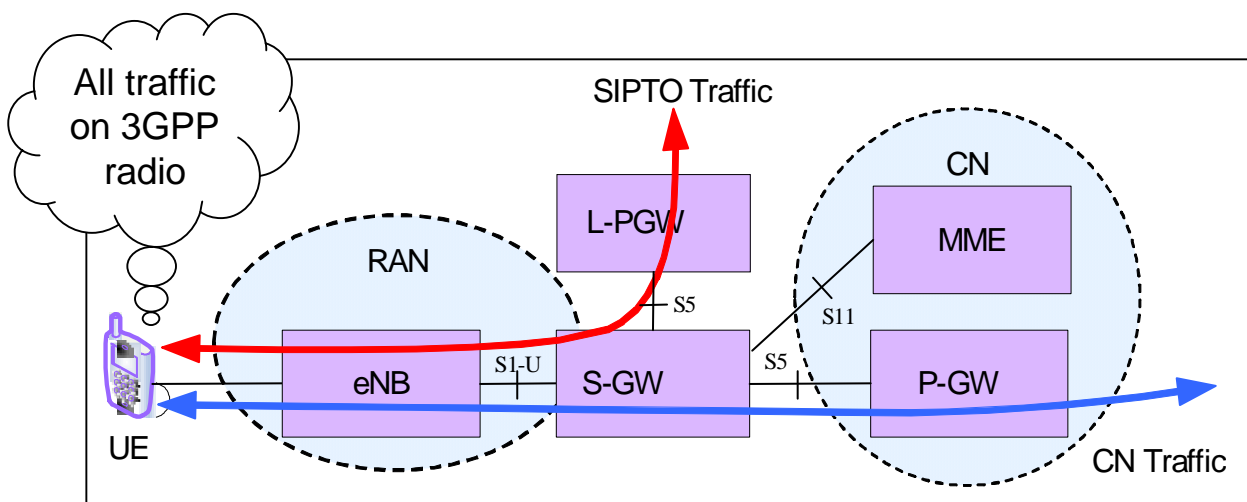


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Selective IP Traffic Offloading (SIPTO)



- ❖ Optimising “cost per bit” is becoming essential in the “flat rate” era
- ❖ SIPTO is a specific routing scenario within the operator’s network, allowing *selective* offloading of the traffic away from the Evolved Packet Core network
- ❖ SIPTO benefits the cellular operator and it is transparent for the end user
- ❖ SIPTO is intended for allowing cost optimized handling of the internet traffic that is not intended for the operator’s core network
- ❖ Local GW is selected for the traffic to be offloaded





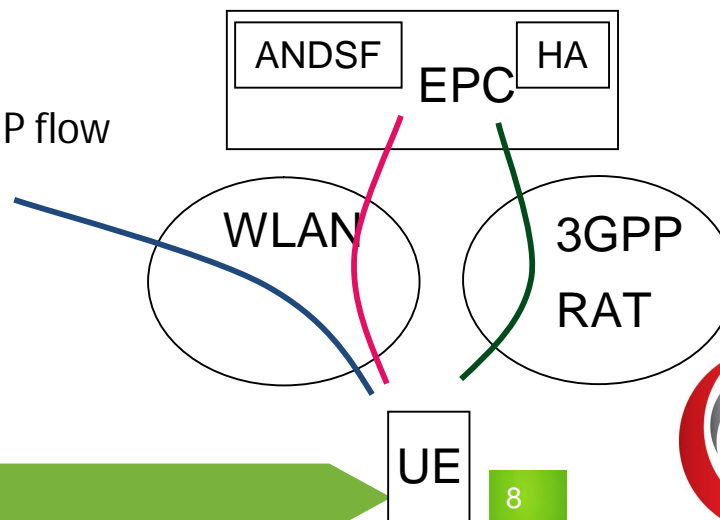
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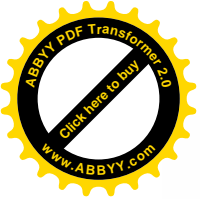
WLAN Offloading



- WLAN offloading refers to the dual radio scenario where part of the traffic is routed via WLAN access and part via 3GPP access
- The 3GPP Evolved Packet Core network (EPC) as the common core network serves both 3GPP radio access technologies and non-3GPP radio access technologies
- WLAN offloading covers both the scenario where the traffic via WLAN radio is anchored in the EPC (i.e., seamless offloading) and the scenario where it is not anchored (i.e., non-seamless offloading)
- Access Network Discovery and Selection Function (ANDSF) is there to provide the UE with the access network discovery information and the policy on how to use the available access networks

- Available access networks
- Preferred routing of the traffic per APN, per IP flow











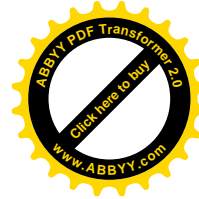
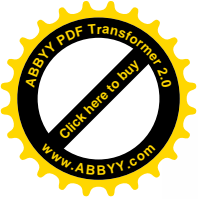
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Voice over both CS and PS - the LTE voice solution



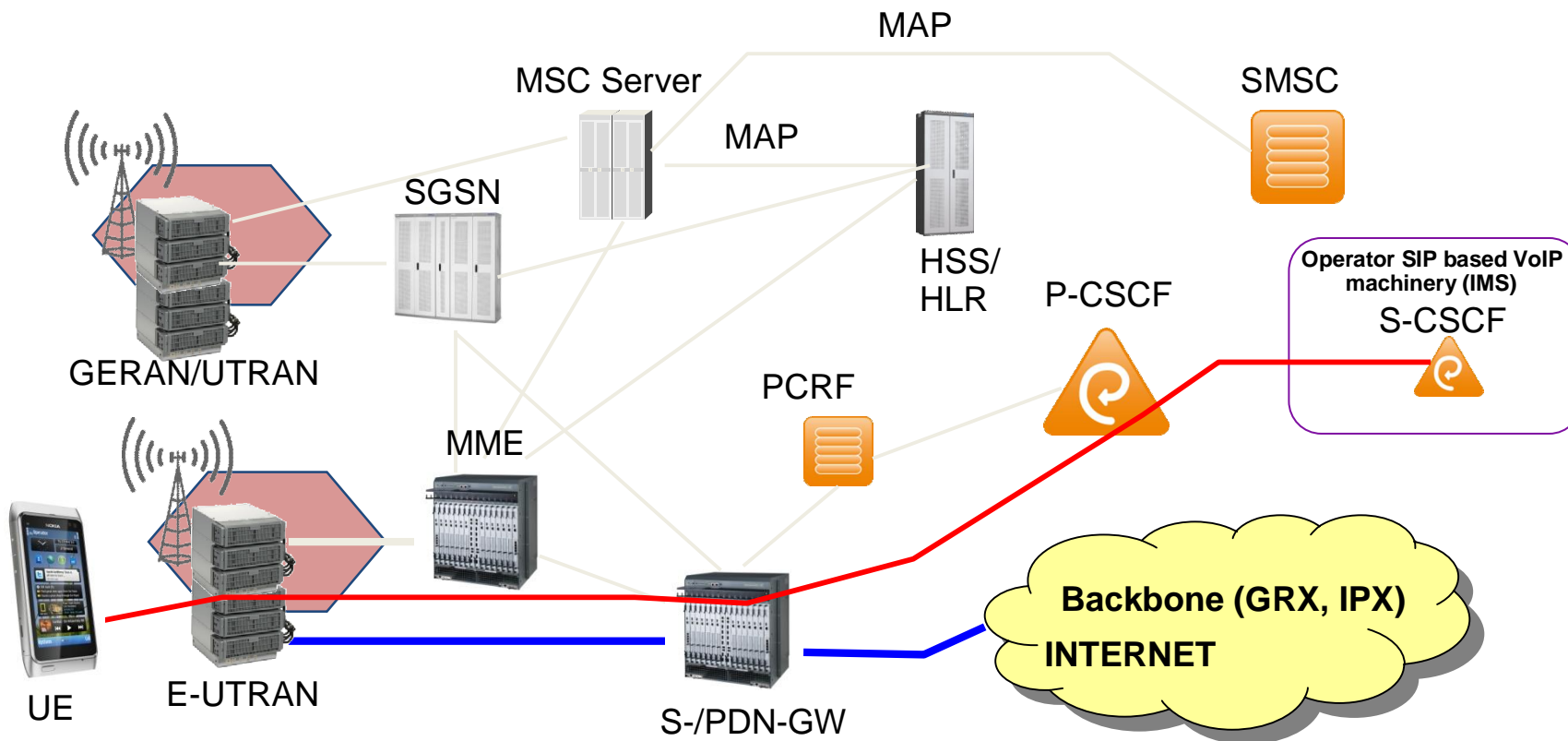
-  CS and PS voice service capabilities
-  CS and PS voice service architecture
-  Multimedia telephony (MMTEL)
-  CS FallBack (CSFB)
-  Single Radio Voice Call Continuity (SRVCC)
-  Emergency calls in LTE

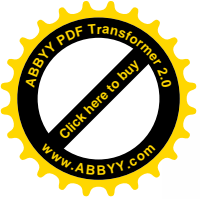




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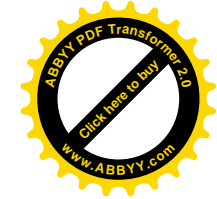
CS and PS voice service architecture





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CS Fallback (CSFB)



Application of CSFB:

- CS capable device camping on LTE cell can establish/receive CS services
- Reuse of existing CS infrastructure for voice service until IMS VoIP is deployed
- Provide voice roaming support with LTE
- Can support emergency calls using existing CS infrastructure

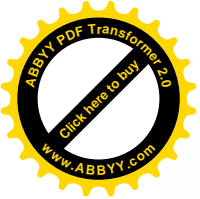
CSFB reuses voice services provided by legacy CS infrastructure

EPS redirects the UE to CS Domain for CS services

- SMS can be delivered to the UE without redirecting to CS Domain
- After CS service the UE returns to LTE, depending on coverage and policy

User can decide, based on CLI, whether to accept CSFB request





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Single Radio Voice Call Continuity (SRVCC)



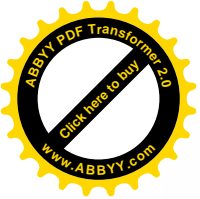
SRVCC use case:

- IMS call initiated in LTE can continue in CS domain after moving outside of LTE coverage area
- SR-VCC is invoked if no other VoIP capable PS system (HSPA/eHRPD) is available for VoIP PS-PS HO
- Requires overlapping with 1xRTT/GSM/WCDMA coverage

SRVCC improvements:

- Mid-call services (like HOLD & MPTY)
- emergency calls
- video calls










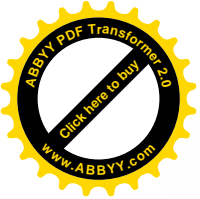
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Future plans, Rel-11 and beyond thoughts & opportunities



-  Multiple accesses
-  Multiple technologies
-  Network sharing
-  National roaming
-  Deployment scenario aspects





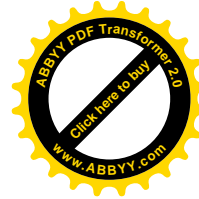
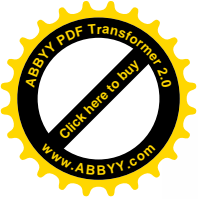
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Deployment scenario aspects



- 📶 LTE can co-exist alongside other technologies in multiple configurations
 - Evolutionary approach to upgrade of networks and migration from 2G/3G networks
- 📶 LTE overlapping with 2G/3G, data only
 - Saturation of fixed internet subscriptions and growth of mobile subscriptions requires faster mobile connections
 - Decline of fixed subscribers and growth of mobile internet subscribers
- 📶 LTE with speech and multimedia support
 - Voice and Multimedia solution for LTE is IMS
 - Rel-9 supports full speech call service in IMS
 - GSMA has published a global solution for VoLTE
 - Regulatory emergency call and public warning system PWS support
 - Comprehensive set of supplementary services over IMS
- 📶 Re-farming of 2G/3G legacy frequencies for LTE use
 - Requires voice call continuity between 2G/3G and LTE in both directions
- 📶 Femto-cells implemented in 3GPP via Home Cells (NodeB and eNodeB)





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Thank You



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