

WELCOME



IPv6 IN MOBILE ENVIRONMENTS

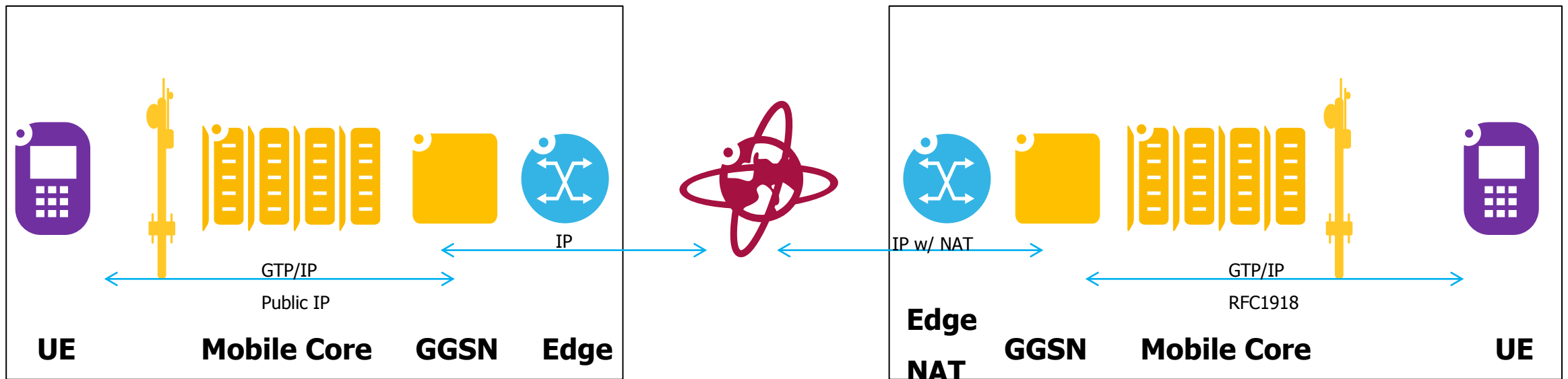
Alastair (AJ) JOHNSON
August 2012

alastair.johnson@alcatel-lucent.com

IPv6 FOR MOBILE ENVIRONMENTS

INTRODUCTION

- Explosive growth of mobile broadband services due to smartphone adoption and the general trend towards 'always-on', 'always-mobile' connectivity has put pressure on IP numbering for mobile networks
- The typical deployment models for mobile broadband services have seen operators either assigning each UE a public IPv4 address, or a private IPv4 address with NAT in the operator network



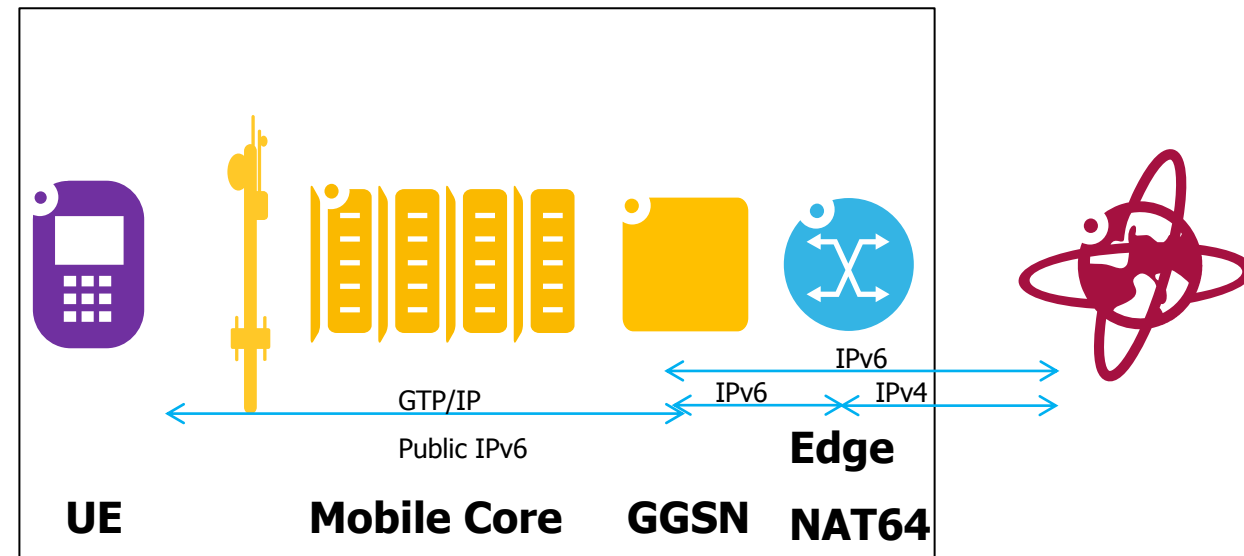
IPv6 FOR MOBILE ENVIRONMENTS

INTRODUCTION

- Deployments using Public IPv4 were common in early established networks where IPv4 resources were plentiful and mobile broadband uptake was initially low
 - Subscriber growth lead to IPv4 NAT introduction, using RFC1918/squatted/martian IPv4 space
 - Typically these networks offered both NAT and no-NAT options with the use of different APNs on the mobile network
 - As subscribers and traffic increased, the number of NATs required substantially increased
 - In turn NAT has pushed CAPEX cost into the network – and OPEX to manage those NATs
- Deployments using Private IPv4 with NAT have become the most common solution, both for new build networks and for established networks that are growing
- **All of the standard drawbacks of deploying NAT exist in mobile environments, although some are not as visible due to the typical usage of mobile broadband**

IPv6 IN THE MOBILE ACCESS

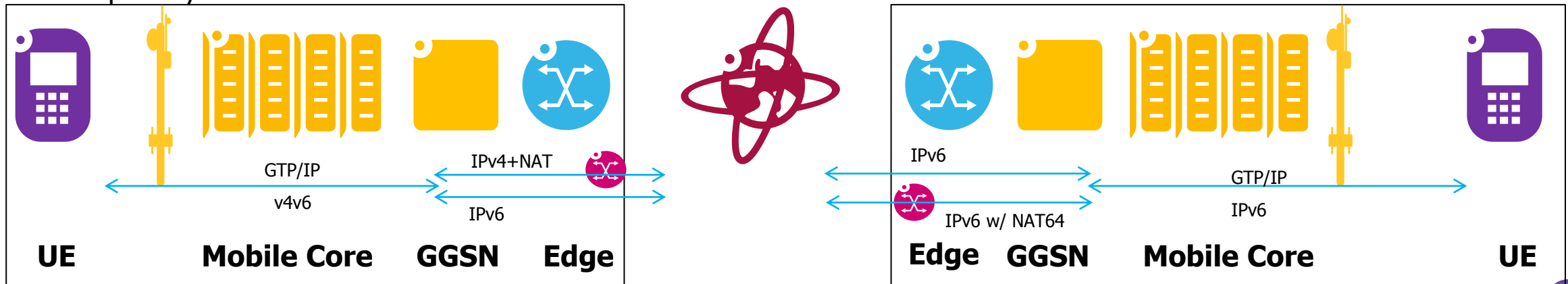
- As networks continue to grow pressure is applied to IPv4 numbering in the access
 - Typically this results in multiple NATs deployed in the network – even multiple NATs per GGSN/P-GW
 - This means managing inside address pools as well as NAT scaling, which in turn triggers traffic engineering management
- Deploying IPv6 into the access becomes attractive as mobile devices start to support IPv6 on the air interface
 - Today support is limited but it is increasing
- When a mobile device can support IPv6 on the air interface, operators can offer native IPv6 services
- In doing so they may reduce the number of edge NATs required in their network, reducing CAPEX and OPEX



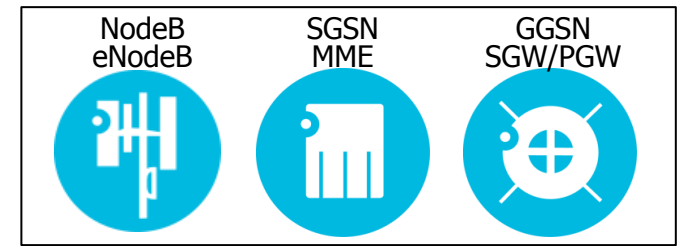
IPv6 IN THE MOBILE ACCESS

WHY DOES IPv6 IN THE MOBILE ACCESS REDUCE CAPEX/OPEX?

- With a large number of demand-bytes originating from IPv6 servers operators may be able to reduce investment in NAT44
- In the case of moving to IPv6-single stack, investment may be shifted to NAT64 (or similar technologies)
 - Existing NAT44 elements may be upgraded to support NAT64, or CAPEX redirected from NAT44 to NAT64
- In the case of offering dual-stack, investment continues in NAT44 but rate is reduced (less IPv4-only traffic)
 - Reduces the number of NATs in the network to only what is required to access IPv4-only servers
- As content continues to adopt IPv6 as a serving platform, the volume of IPv4 traffic should continue to reduce
- IPv4/NAT support continues to be required for devices that can't support IPv6, or cannot support NAT64/DNS64
- To deploy IPv6 in the mobile access, operators must ensure support is in their mobile core for IPv6 services. E.g. 3GPP R8+ capability



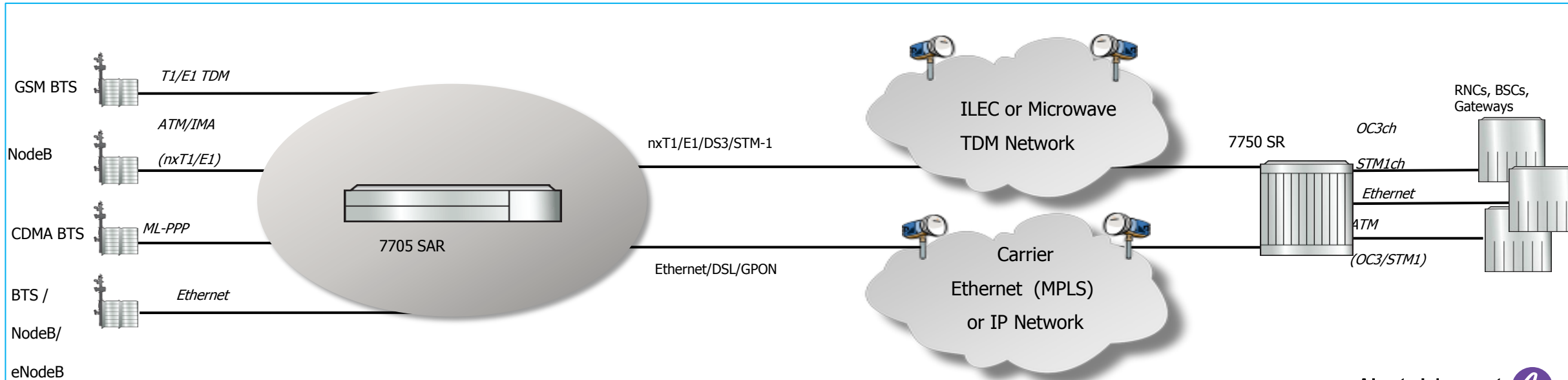
IPv6 IN THE MOBILE CORE



- To enable IPv6 support in the mobile access there is impact in the mobile core and support domains
- 3GPP Releases prior to R8 introduced the support of an IPv6 PDP type, which requires support on the SGSN/GGSN platform and any supporting platforms (HLR, etc)
 - This bearer-type is attractive for IPv6-only services (with/without NAT64)
- 3GPP Release 8 introduces the support of a v4v6 PDP type, which supports dual-stack services on a single PDP
 - Attractive for offering dual-stack services, but assumes that the network will offer both IPv4 and IPv6 services over this PDP type
- Enabling these PDP types requires analysis of the packet core platforms, and what that means for scaling of nodes and any other OSS/BSS support systems
- A particular concern from some operators has been both billing (CDRs) and roaming support, including commercial issues for roaming that have no agreement to support a non-IPv4 PDP type

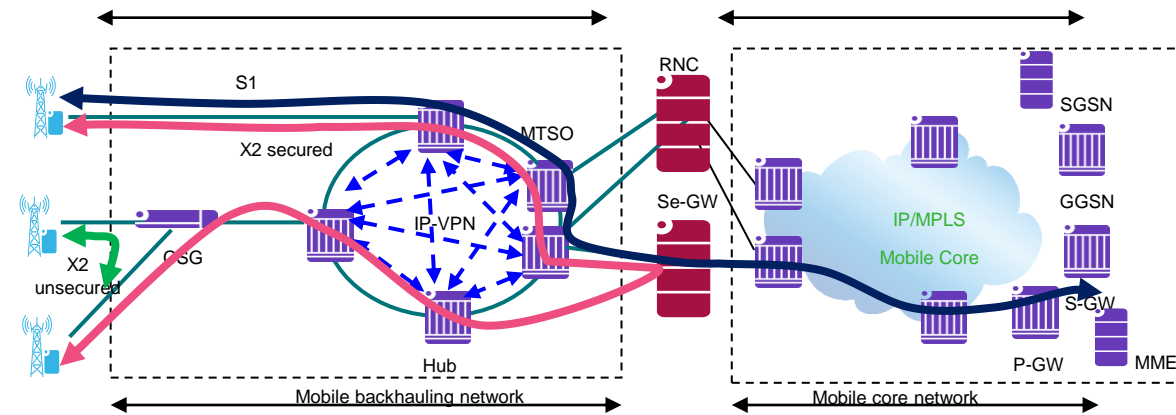
IPv6 IN THE MOBILE BACKHAUL

- As the traffic in mobile networks has grown explosively, operators have had to re-evaluate their backhaul technologies
 - SONET/SDH, PDH microwave etc are no longer able to support the significant bandwidth demands at a cell site
 - Packetized technologies have taken over dominance in the mobile backhaul market
 - IP and IP/MPLS have become extremely popular for this role



IPv6 IN THE MOBILE BACKHAUL

- As IP nodes are deployed into the mobile network to support backhaul, new numbering challenges appear
 - All of those IP nodes need link addresses and loopback addresses
 - In some large mobile networks there are 100,000 or more cell-site routers that need to be numbered, potentially with multiple circuits back to the core network
 - Managing this with RFC1918 space is a challenge
- A number of operators are looking to IPv6 as a solution to this problem, particularly for networks where end-to-end IP is supported between the cell site node (eNB) and the mobile core
 - Particularly LTE
- Some operators are also analyzing IPv6 signaled IP/MPLS support in order to remove IPv4 from their MPLS cores/backhaul networks



OTHER GENERAL TRENDS



- Service offerings for IPv6 over mobile networks are out in the wild today
 - Some operators in North America and Europe have trial IPv6 or production IPv6 platforms
 - Many customers are unaware that their device already gets an IPv6 address
- As the world evolves towards LTE I think we can expect to see more IPv6 access
- Although there is still a requirement for the handset operators to support IPv6 on the air interface
 - Today IPv6 support on 2G/3G air interfaces is quite limited
 - But again, LTE requires this so we should start seeing this more often
- Many operators see IPv6 as opportunity to reduce cost or reduce scaling complexity in their mobile networks
- As mobile networks are rearchitected, services will need to evolve to support IPv6, e.g. Voice over IP for VoLTE offerings should see IPv6 support to avoid the need for any NAT nodes in the Voice path

AT
THE
SPEED
OF
IDEAS™

AT
THE
SPEED
OF
IDEAS™

www.alcatel-lucent.com