IPv6 Transition Solutions for 3GPP Networks
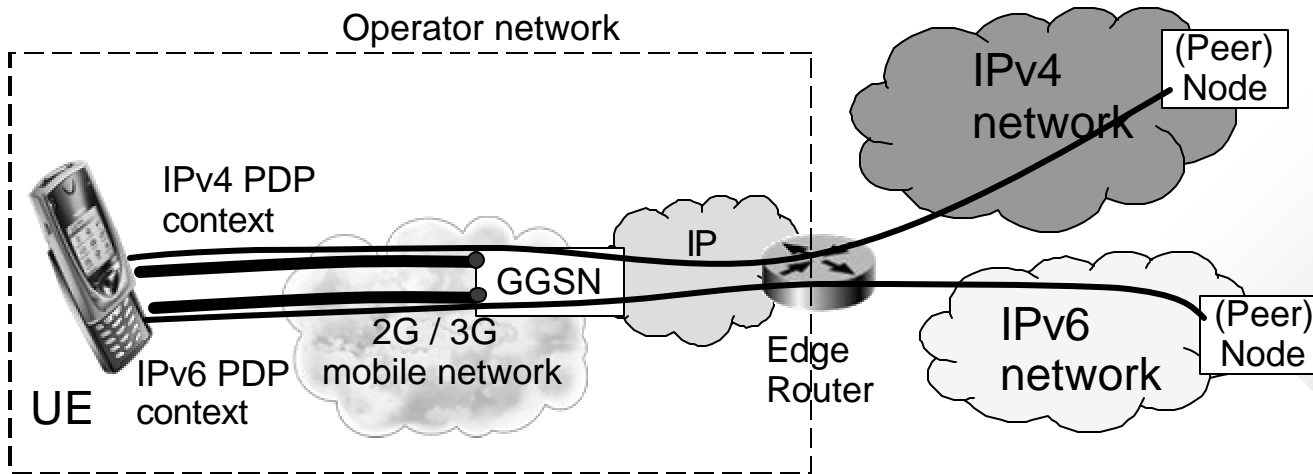
draft-wiljakka-3gpp-ipv6-transition-00.txt

Juha Wiljakka, Nokia
on behalf of the "3GPP ngtrans" design team
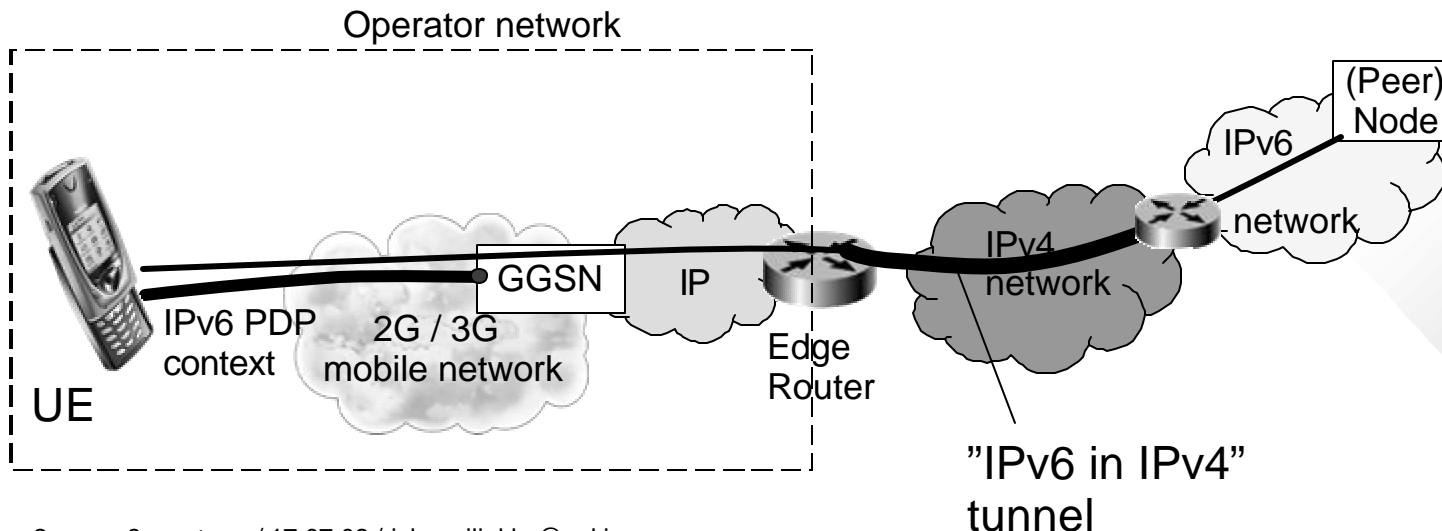
54th IETF Meeting, Yokohama, Japan
17.07.02

GPRS scenarios 1 and 2

1. Dual stack UE connecting to IPv4 and IPv6 nodes

Operator network

IPv4 network

(Peer) Node

IPv4 PDP context

IP

GGSN

2G / 3G mobile network

Edge Router

IPv6 network

(Peer) Node

IPv6 PDP context

UE

- The most extensive scenario.
- Dual stack UE: both stacks can be simultaneously active.
- Managing the IPv4 address pool is a challenge.
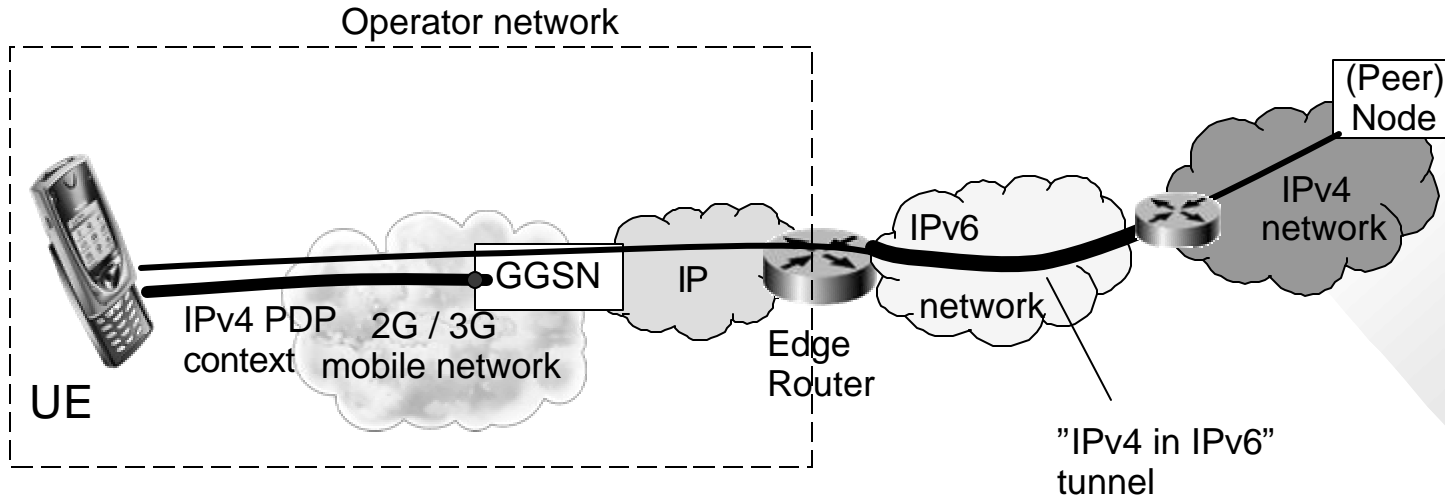- Use of private IPv4 addresses means use of NATs – that should be avoided.

2. IPv6 UE connecting to IPv6 node through an IPv4 network

Operator network

(Peer) Node

IPv6 network

GGSN

IP

Edge Router

IPv4 network

IPv6 PDP context

2G / 3G mobile network

UE

"IPv6 in IPv4" tunnel

- Making the "IPv6 in IPv4" tunneling in the network.
- Tunneling can be static or dynamic.
- Compare with 6bone.

GPRS scenarios 3 and 4
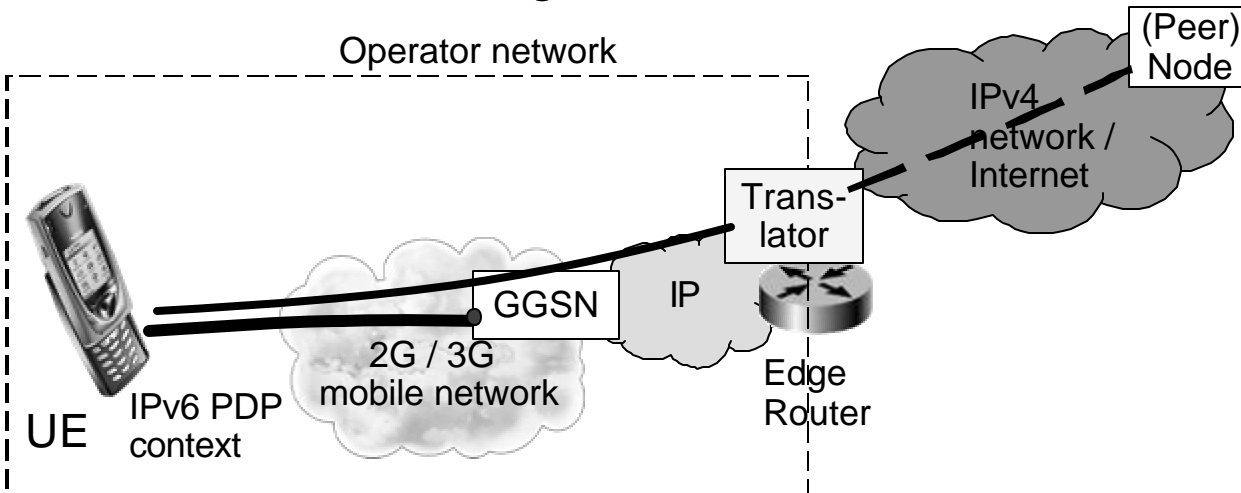
3. IPv4 UE connecting to IPv4 node through an IPv6 network

Operator network

(Peer) Node

IPv4 network

IPv6 network

GGSN

IP

UE

IPv4 PDP context

2G / 3G mobile network

Edge Router

"IPv4 in IPv6" tunnel

- "IPv4 in IPv6" (static or dynamic) tunneling in the network

- The scenario is not considered very likely in 3GPP netw...

4. IPv6 UE connecting to an IPv4 node

Operator network

(Peer) Node

IPv4 network / Internet

Trans-lator

GGSN

IP

UE

IPv6 PDP context

2G / 3G mobile network

Edge Router

- Translation is needed, because the UE and the peer node do not share the same IP version.

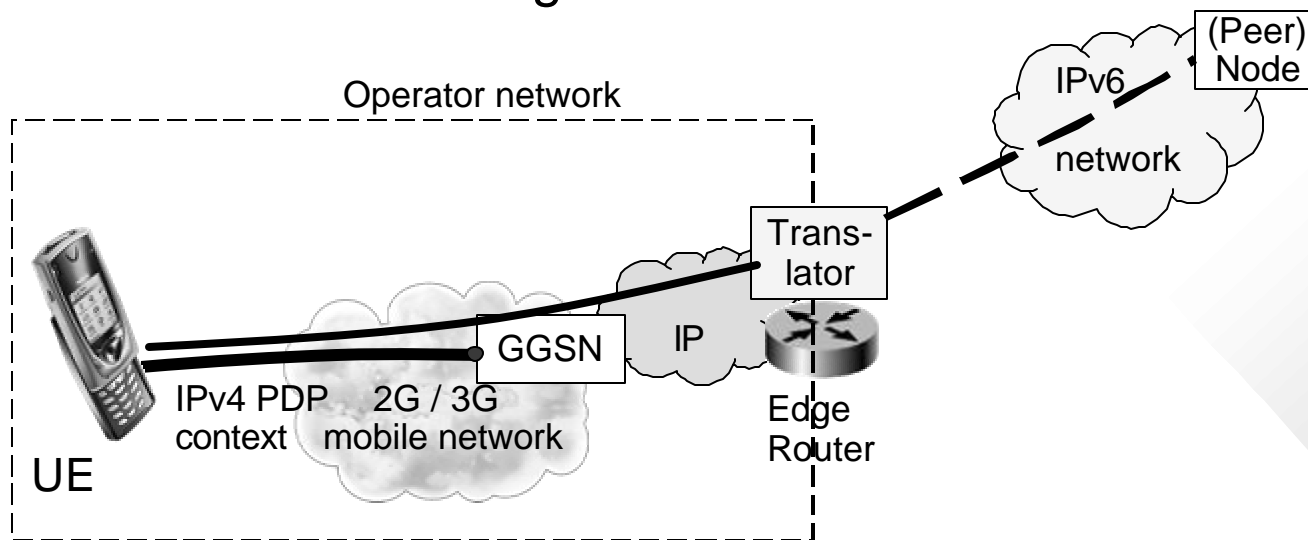- NAT-PT has certain problems, use of NAT64 will be analyzed.
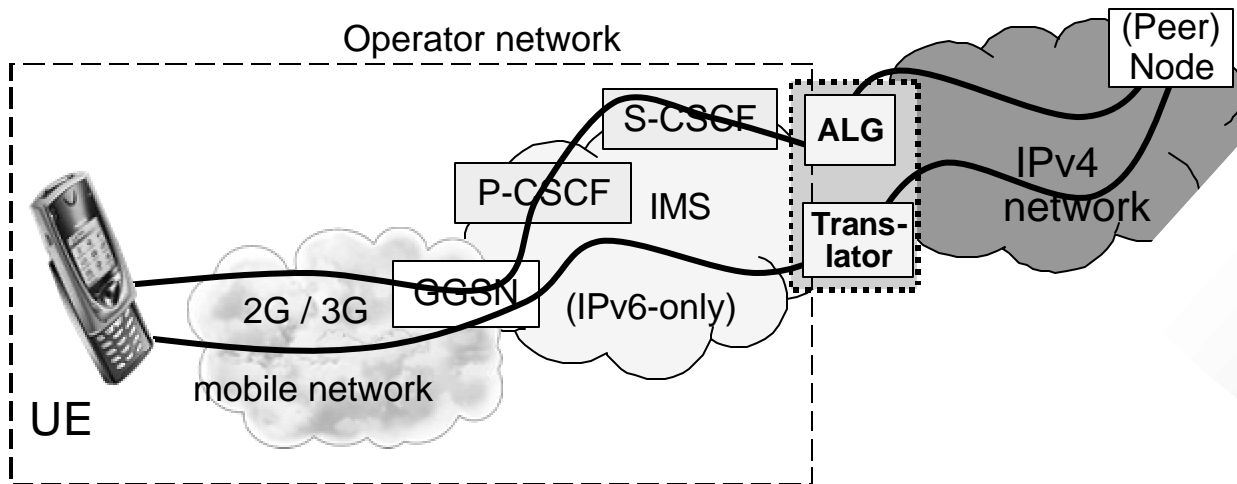
GPRS scenario 5

5. IPv4 UE connecting to an IPv6 node

- Translation is needed, because the UE and the peer node do not share the same IP version.

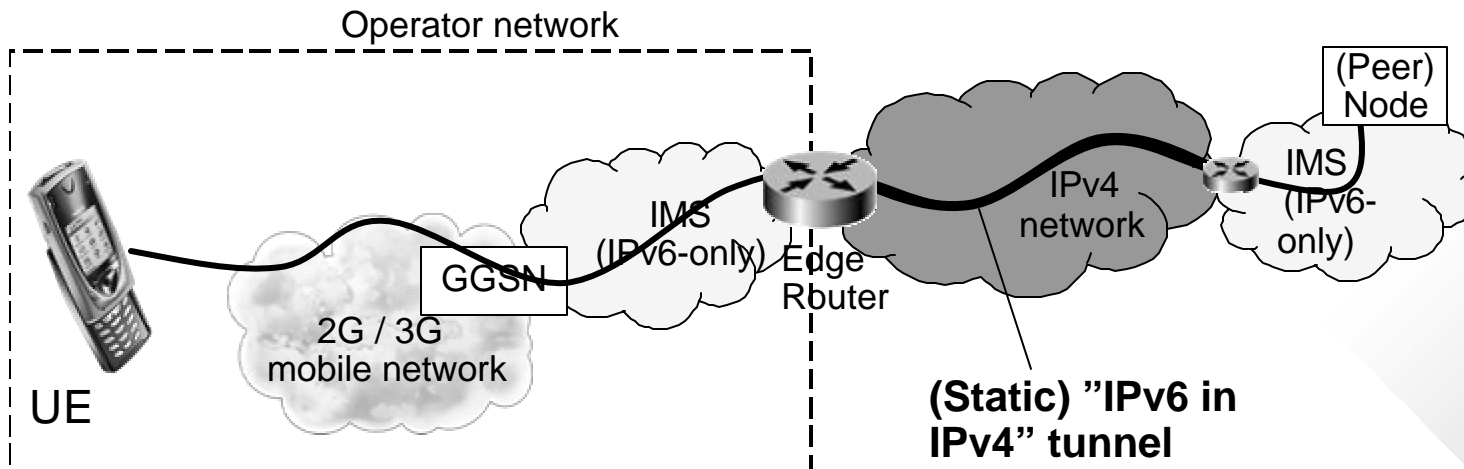- NAT-PT has certain problems, use of NAT46 will be analyzed.

IMS scenarios 1 and 2

1. UE connecting to a node in an IPv4 network through IMS

Operator network

- S-CSCF
- ALG
- P-CSCF
- IMS
- Trans-lator
- GGSN
- (IPv6-only)
- IPv4 network
- (Peer) Node
- 2G / 3G mobile network
- UE

- UE has IPv6 connection to the IMS and from IMS to an IPv4 node.

- Translation needed in two levels:
  - SIP and SDP in an ALG
  - User data traffic at IP level.

- This is a challenging case.

2. Two IMS islands connected via an IPv4 network

Operator network

- IMS (IPv6-only)
- Edge Router
- GGSN
- IPv4 network
- IMS (IPv6-only)
- (Peer) Node
- 2G / 3G mobile network
- UE
- **(Static) "IPv6 in IPv4" tunnel**

- Closely related to GPRS scenario 2.

- Connection of two IPv6-only IMS islands has to be made over IPv4 network.

- Compare with 6bone.

- NAT-PT has its limitations. Those include:
  - NAT-PT is a single point of failure for all ongoing connections.
  - Additional forwarding delays due to further processing, when compared to normal IP forwarding.
  - Problems with source address selection due to the inclusion of a DNS ALG on the same node.

- Recommended actions:
  - The separation of the DNS ALG from the NAT-PT node.
  - Ensuring that NAT-PT does not become a single point of failure.
  - Load sharing between different translators.

- A recent "NAT64 - NAT46" (draft-durand-ngtrans-nat64-nat46-00.txt) might provide a solution.

- **IMS scenario 1** is challenging due to two levels of translation:
    - SIP / SDP signalling
    - User IP traffic

- In proposed solution, SIP ALG translates SIP traffic, and also coordinates user IP traffic translation.
    - E.g. setting up the IP addresses in the user traffic translator.

$\Rightarrow$ Solution to this scenario still needs some work.

- Tunneling over the air interface should be avoided, i.e. "IPv6 in IPv4" tunneling should mainly be handled in the network, not in the UEs.

- The IPv4 / IPv6 interworking should be mainly handled in the network, not in the UEs.

- Implementation of dual stack for the UEs is recommended, at least during the early phases of IPv6 transition.

3gpp_tra

- We appreciate comments and input from the people in the Ngtrans wg a lot.

- Please read the two documents and give comments on the ngtrans mailing list. Comments can also be sent directly to the document editor juha.wiljakka@nokia.com

$\Rightarrow$ Can this draft become a WG draft?