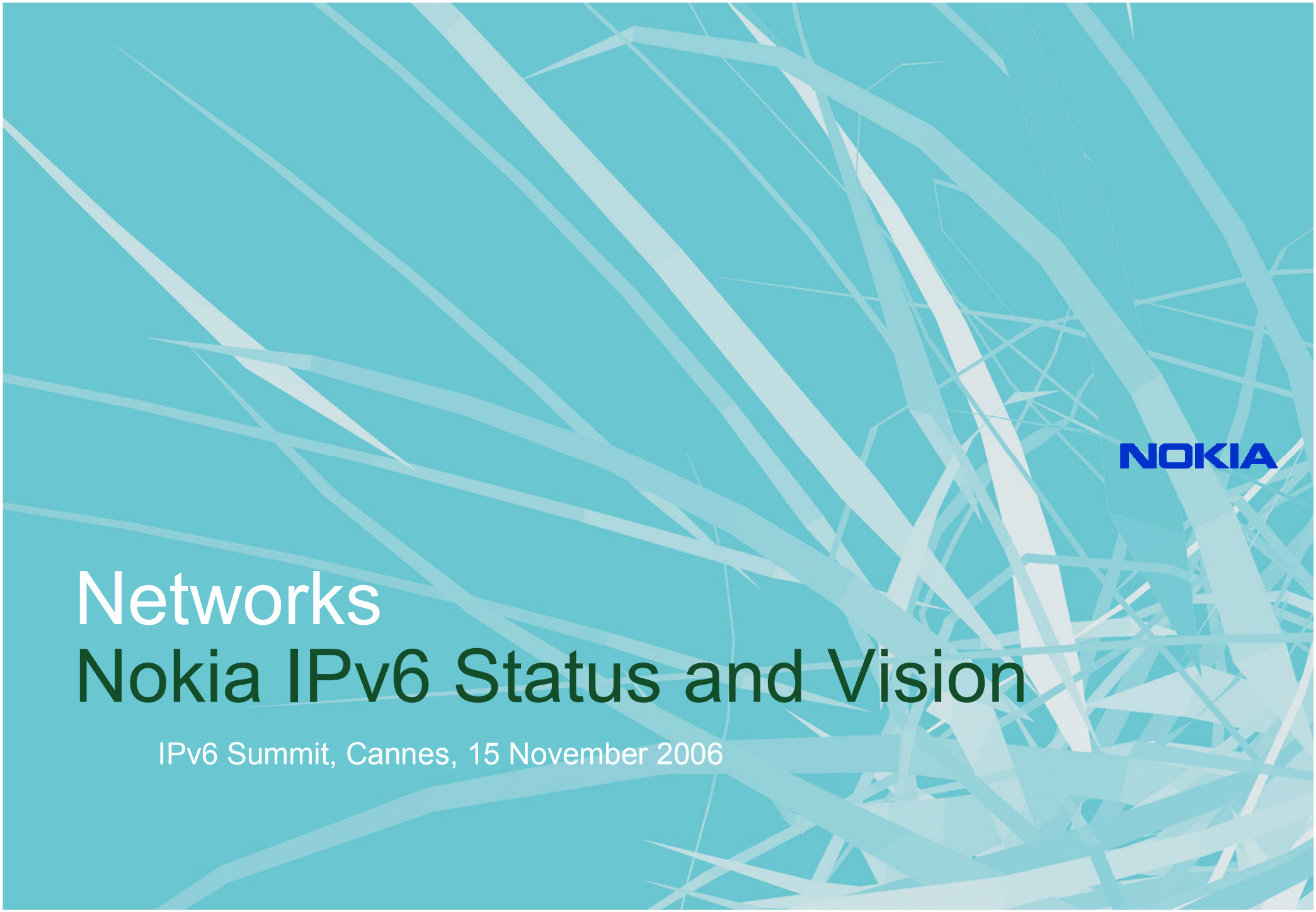


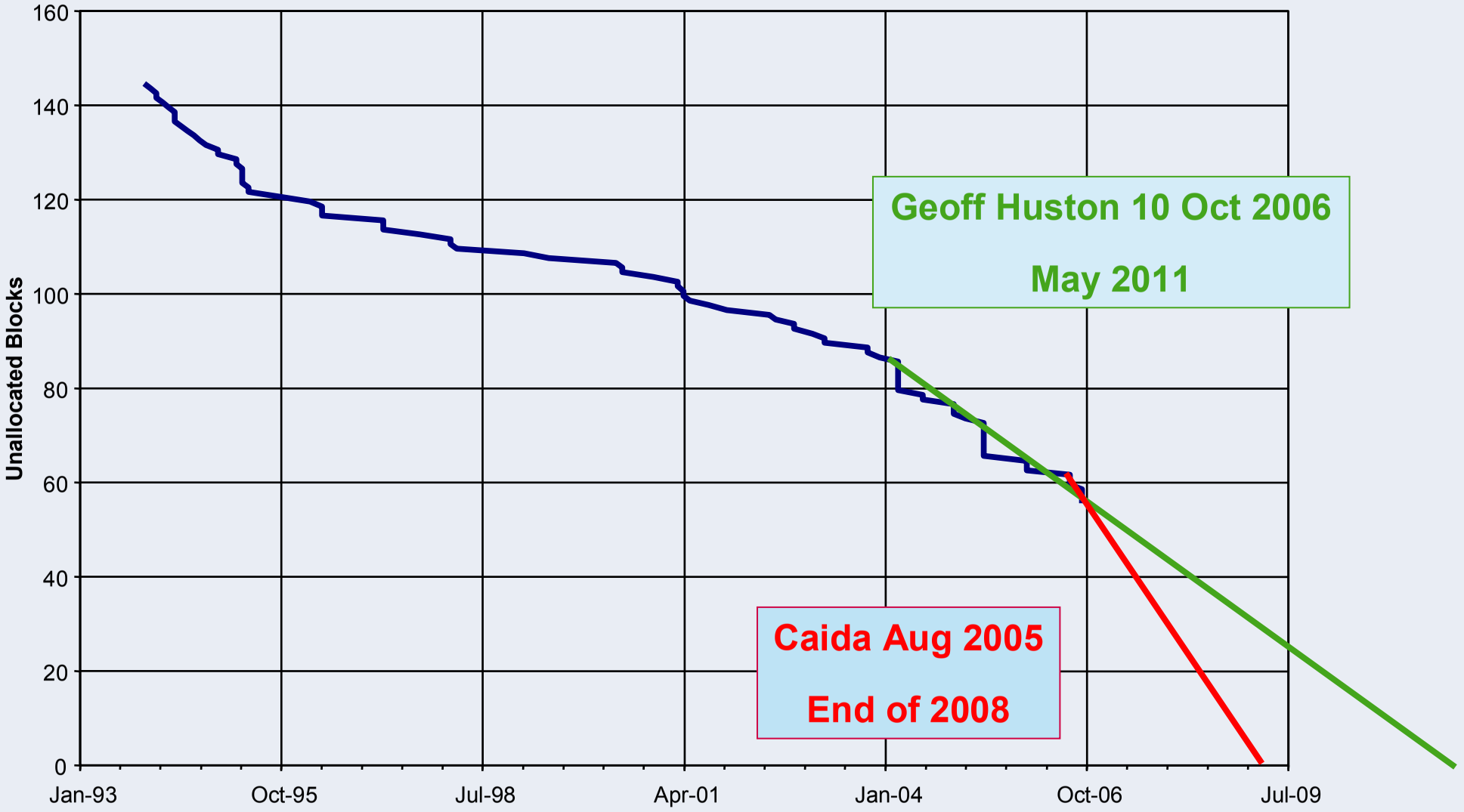
Networks
Nokia IPv6 Status and Vision

IPv6 Summit, Cannes, 15 November 2006

Contents

- IPv4 address space problems today
- IPv6 in Nokia Networks
- IPv6 in Nokia mobile phones and multimedia computers

Remaining /8 IPv4 IANA Allocations



What's Driving This?

- Increased rate IPv4 address allocations likely being driven by
  - Low cost Broadband deployments (Cable, DSL, etc.)
  - WLAN hotspots
  - GPRS / 3G / CDMA-1x deployments
  - China, India, …
- We may be moving from the point where one IPv4 address shared by many people to
  - Multiple IPv4 addresses allocated per person
- Another factor is large organizations growing beyond the IPv4 Private address space
  - RIR policies allow the use of Public IPv4 addresses in this case

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Private IPv4 Address Space Shortage

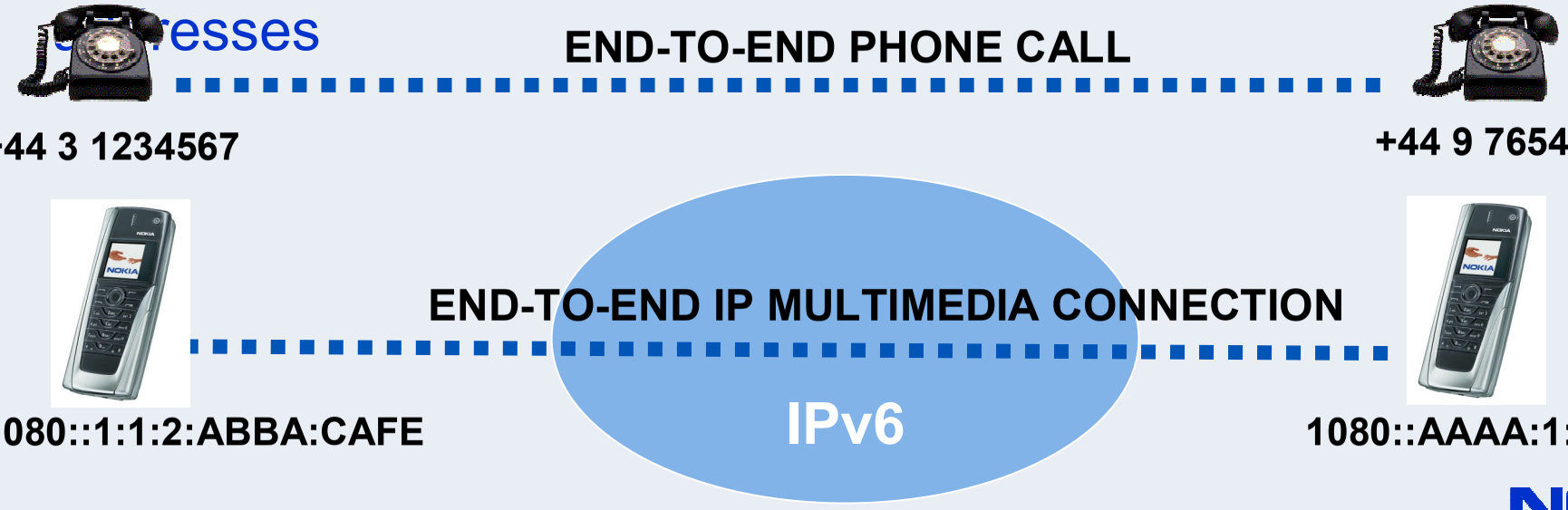
- Most operators lack public IPv4 addresses for the end-users.
  - Private addresses & NATs (and/or application proxies) are used.
- IPv4 private address spaces are not inexhaustible.
  - 10.0.0.0 - 10.255.255.255 → ~16.8M addresses
  - 172.16.0.0 – 172.31.255.255 → ~1M addresses
  - 192.168.0.0 – 192.168.255.255 → ~65k addresses

  ⇒There are **circa 18 million private IPv4 addresses in total**.
- Operators wish to start deploying always-on PDP contexts for the end-users.
  - The biggest operators have hundreds of millions of subscribers.

➔Not enough **private** IPv4 addresses for big operators.

IPv6 restores simplicity in the network

- Resolves the address space limitation of IPv4
- Enables global peer-to-peer services across different networks
  - What is possible with IPv4 in limited scale, is globally possible with IPv6
- Less complexity in network maintenance
  - No private address spaces with NATs needed → OPEX and CAPEX savings.
- End-to-end security features easily deployed with global IP addresses



IPv6 in the Mobile Network:
IPv6 User vs. Transport Planes

- **User plane IPv6 affects** (Gi interface only)

terminals

GGSN/ISN
application SW

Selected
application servers
(IMS)

R6 IMS-PSTN
VoIP GW

- **Transport plane IPv6 affects** (Gb, Iu, A, Gn, Gp, Gr, Nc, Nb, etc.)

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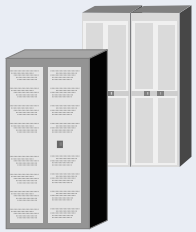
Nokia Networks IPv6 Strategy

- For IMS and other peer-to-peer services, Nokia sees IPv6 as an important enabler.
- Most relevant Nokia Networks products support User Plane IPv6 already today.
- Nokia IMS products support IPv6 from day 1.
  - Network servers.
  - Terminals.
- Currently, no urgent need for Transport Plane IPv6.
  - System-wide Transport Plane IPv6 support solutions not currently roadmapped.
  - Platforms include IPv6 support, enabling rapid inclusion of Transport Plane IPv6 solution to Nokia products when needed.

IPv6 status in Nokia Networks products/solutions

- GGSN and ISN user plane IPv6 support exists.
- SGSN (both 2G and 3G) user plane IPv6 support exists.

→IPv6 for user traffic in 3GPP cellular networks.



3GPP Rel4

- MSC Server System (MSC Server & Media Gateway) includes IPv6 support.
  - System tests not fully conducted yet.
  - Commercial (non-trial) support in the next major release.

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IPv6 status in Nokia Networks products/solutions

- IMS elements (CPS, IMR) support IPv6 from day 1.

- The Session Border Controller (SBC) used with the IMS solution will include IPv6 support in the near future.
  - Also IPv4-IPv6 translation for the media streams.

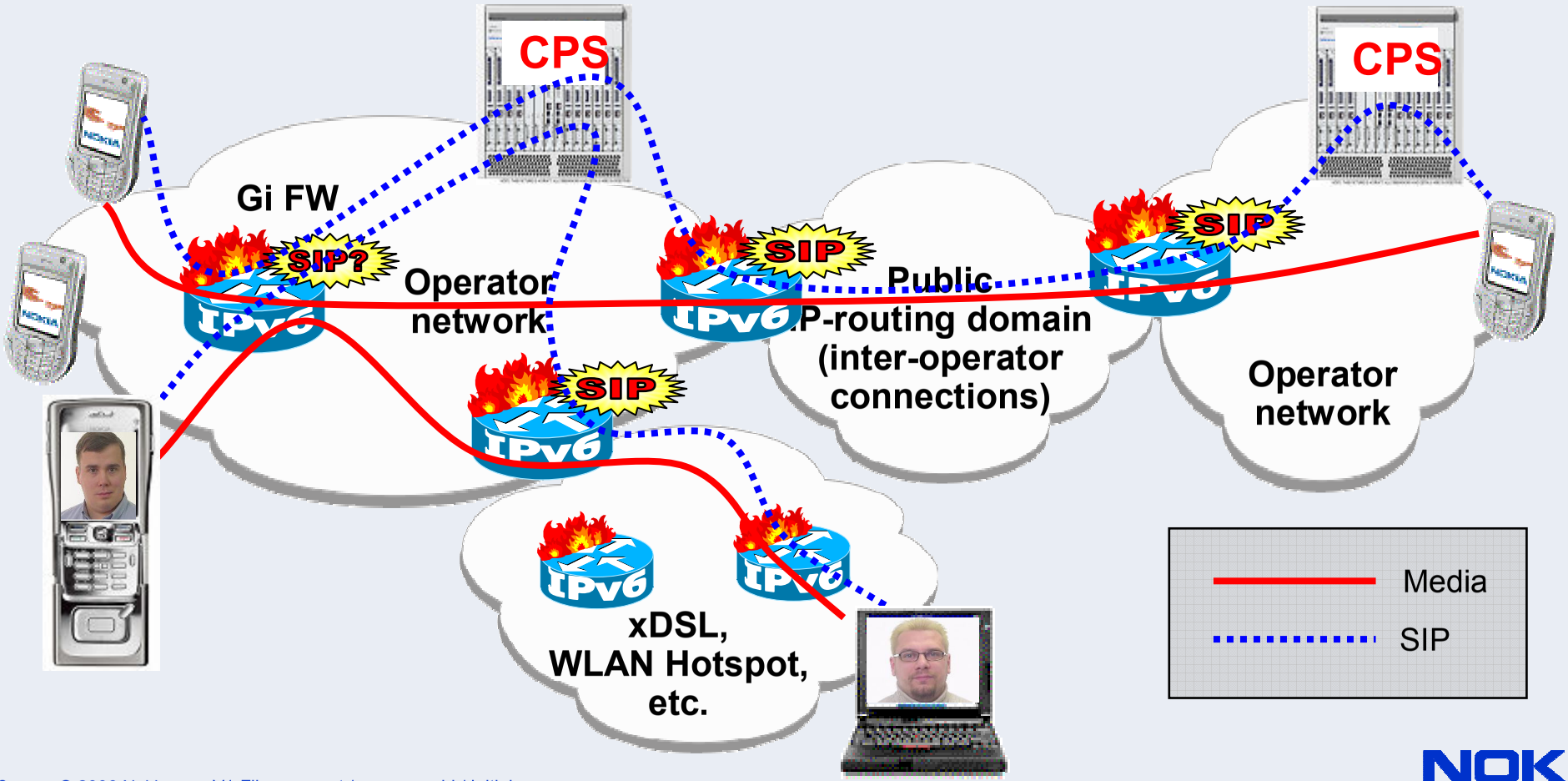
- Nokia-CheckPoint FW IPv6 support exists.
  - Also SIP awareness over IPv6.

IPv6 status in Nokia Networks products/solutions

- Nokia NetAct/OSS supports the configuration and management of IPv6-related parameters.
  - Currently no support for running O&M traffic over IPv6.
  - Commercial IPv6-capable platforms used for the OSS elements.
  - IPv6 support for O&M traffic to be added when there is demand from the operators.

IMS solution with IPv6 & SIP aware FWs

No problems with NATs & private addresses.
All components already available!



IPv6 and applications in Symbian terminals

- Applications and IPv6
  - Basic applications support IPv6: browsing, e-mail, …
  - Nokia SIP stack supports both IPv4 and IPv6, so do applications such as Video Sharing
- Important points
  - Making sure that all applications are written IP-version independent, i.e. working both over IPv4 and IPv6
    - Also 3rd party applications
  - Testing applications carefully also over IPv6

IPv6 in Nokia terminals

- IPv6 (dual IPv4/IPv6 stack) included in Symbian 7.0s, 8.0, 9.1, and onwards
- S60 - support starting from S60 Rel. 2.6
  - Nokia 6630, 6680, 6681, …
  - Nokia Nseries multimedia computers: N70, N73, N90, N91, N95, N80, …
  - Nokia Eseries devices: E60, E61, E70, …
- Nokia 9500 Communicator (IPv6 also over WLAN), Nokia 9300/9300i
- Nokia 7710
- S40 mobile terminals support IPv6 for IMS applications (e.g. Video Sharing) and for Nokia Push to Talk over Cellular
  - 5140, 5140i, 5500 Sport, 6020, 6021, 6101, 6111, 6154, 6170, 6230i, 6270, 6280, 6288, 7270, etc.

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Summary

- ✓ IPv4 addresses are definitely running out
- ✓ Mobile operators lack IPv4 addresses
  - – Also the private ones
- ✓ Nokia Networks is ready for IPv6 user traffic.
  - – 3GPP packet core, IMS, IP backbone, …
- ✓ Most Nokia mobile phones and multimedia computers support IPv6

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