

Minimum IPv6 Functionality for a Cellular Host

`<ietf-manyfolks-ipv6-cellular-host-00.txt>`

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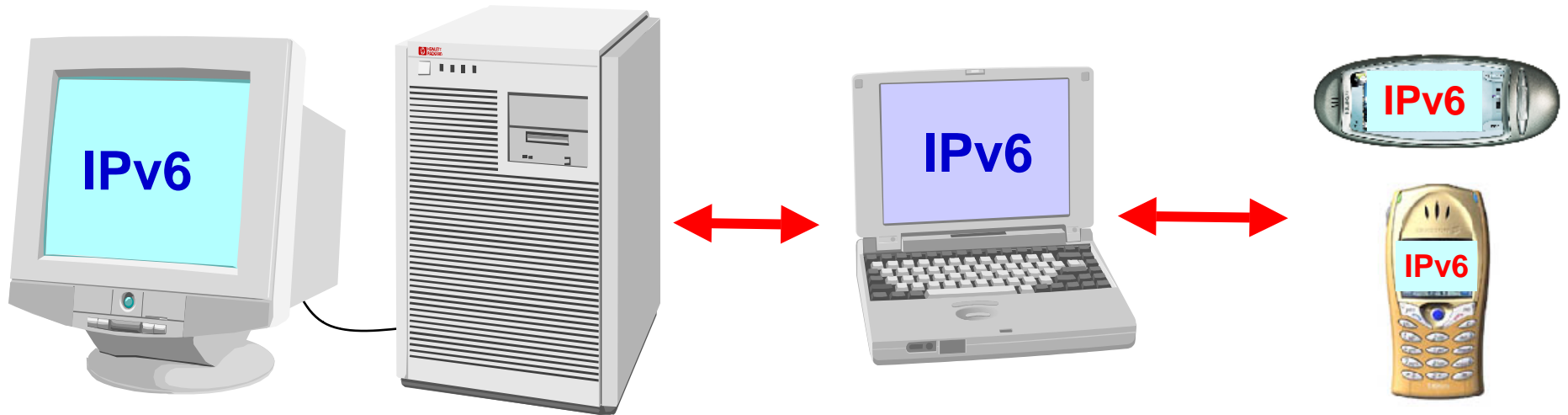
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Contents of this Presentation

- There are IPv6 hosts *and* IPv6 hosts
- Scope & Goals
- Some Functionality Scenarios
- Next Steps

There are IPv6 hosts *and* IPv6 hosts



- Very big differences can be found when comparing these IPv6 hosts with respect to size, weight, memory, processor capacity, power consumption / battery capacity and upgradeability.

The Scope of this Presentation & Draft

- We assume that everyone has read the draft (and all IPv6 RFCs).
- We consider Cellular Hosts only, routing functionality is *not* considered (end-to-end IPv6 connections only).
- No discussion on 3GPP/3GPP2 network architecture (see the IPNGWG Interim Meeting Notes from May 2001 for a presentation & discussion of the network architectures).
- With respect to 3GPP, Release 99 specifications serve as a baseline.
- We assume that the network provides transition mechanisms.

Some Background for This Work

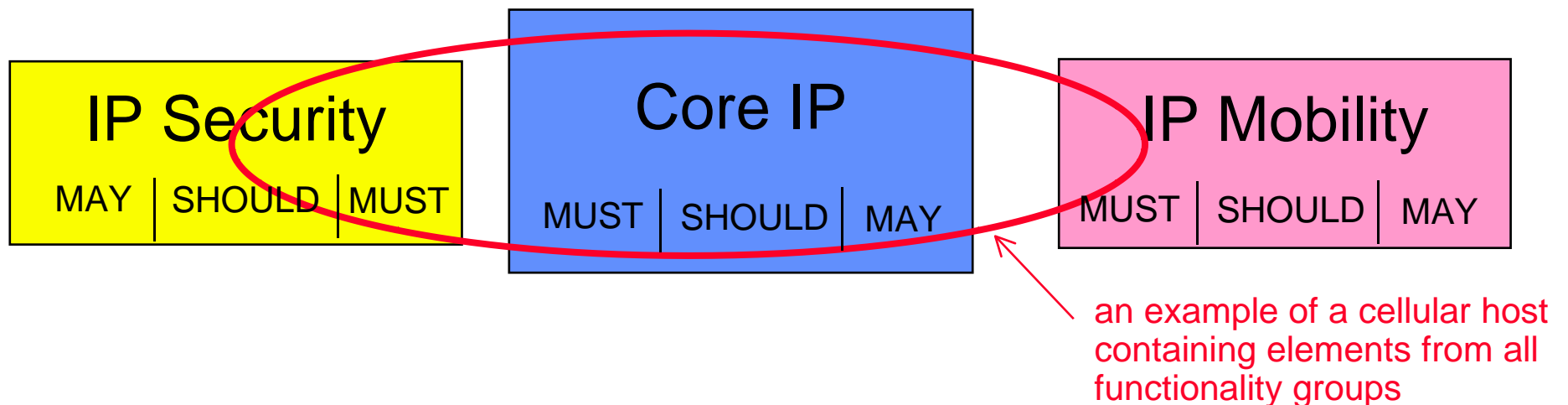
- An IPv6 cellular host is a terminal which uses an air interface to connect to a cellular access network (e.g. GPRS, UMTS or CDMA2000) in order to provide IPv6 connectivity to an IP network.
- Other wireless technologies, such as Bluetooth or WLAN, are *not* considered in this draft.
- Use of IPv6 in 3GPP architecture
 - PDP Type IPv6 was introduced already in 3GPP Release 97 (GPRS).
 - The UMTS IP multimedia terminals (Release 5) exclusively support IPv6 for connection to services provided by IMS.
- There is at least a need coming from 3GPP for thoroughly defining IPv6 functionality for a cellular host in the IETF.
- IPv6 covers a lot of RFCs; there are lots of MUSTs, SHOULDs, MAYs and dependencies.
- 3GPP2 is considering IPv6 usage in their system.

Goals

- To promote the rapid adoption of IPv6 and ensure smooth deployment.
- To ensure that the cellular hosts are good citizens of the Internet.
- Cellular host typically has a very limited size, weight, memory, processor capacity and battery capacity – Moore's Law is not the only consideration.
 - ⇒ The size and the complexity of the software implementation should be minimized. Not all IPv6 features are needed in all hosts.
- Cellular host software often cannot be upgraded, yet it must meet tough demands for interoperability with other IPv6 hosts.
 - ⇒ The protocol software shall be well defined to avoid interoperability problems.
- In general, cellular terminals **MUST** work. Upgrading, patching, rebooting (ctrl-alt-del) is not an option. If it doesn't work, then it is broken.

Three Functionality Groups

- The draft defines three functionality groups:
 - **Core IP** includes core parts of IPv6 - it contains only RFCs needed in all situations under all conditions.
 - **IP Security** contains IP Security (IPsec) details for cellular hosts.
 - **IP Mobility** contains IP Mobility details for cellular hosts.
- The functionality groups are written to enable the implementation of different types of cellular hosts, which may have different uses.
- In some cases we show how to resolve conflicts between IPv6 specifications and cellular network functionality.



RFC 2461 From a Cellular Host Point of View 1/2

- Neighbor Discovery described in RFC 2461 **MUST** be supported by the cellular host.
- In cellular networks, some Neighbor Discovery messages can cause unnecessary traffic and consume valuable bandwidth.
- If a cellular link resembles a point-to-point link, a mobile terminal may only have its default routers as neighbors.
 - ⇒ In that case Neighbor Solicitation and Advertisement messages **MAY** be implemented.
- If a cellular host does not have a MAC address on its cellular interface, the link layer suboption **SHOULD NOT** be implemented for this interface.

RFC 2461 From a Cellular Host Point of View 2/2

- Neighbor Discovery in 3GPP architecture
 - 3GPP cellular hosts only need to support Router Solicitations and Router Advertisements for 3GPP IPv6 Stateless Address Autoconfiguration (more information can be found in Appendix A).
 - Neighbor Solicitations and Advertisements MAY be supported for Neighbor Unreachability Detection. They are not needed for 3GPP IPv6 Stateless Address Autoconfiguration, since Duplicate Address Detection is not needed in this address assignment mechanism.

Security Scenarios

- Recommendations are given on what security solution to employ in the following services:
 - VPN service from the cellular host to a corporate intranet.
 - MUST support IPsec and IKE
 - A basic web browsing service.
 - SHOULD support SSL or TLS
 - IP Multimedia Service (such as one defined by 3GPP Rel5 specs)
 - Under discussion in 3GPP.
 - Mobility service as defined by Mobile IP.
 - Under discussion in the IETF.
 - Protection of the IPv6 signaling within visited networks.
 - Feasibility is an open issue. End-to-end security solution is preferred.

Mobile IPv6 Scenarios

- Mobile IPv6 functionality within Mobile Nodes can be divided to the following parts:
 - Correspondent Node (CN) functionality
 - MUST be supported by all nodes.
 - Mobile Node (MN) functionality
 - MUST be supported when MIPv6 is used for intra-domain mobility.
 - SHOULD be supported when the cellular host maintains connections across multiple interfaces (e.g. WLAN Interface).
 - Route Optimization (RO)
 - Route Optimization SHOULD be supported by all hosts when the communication benefits from this optimization.
- Localized Mobility Management solutions (such as HMIPv6) and Fast-Handovers for Mobile IP SHOULD be supported, when the communication benefits from this optimization.

Some Comments Received

- Clarification needed on the meaning of cellular hosts.
- Clarification of the goals of draft unclear.
- Fix language on Path MTU Discovery, some confusion on this.
- Multicast Listener Discovery - multicast in general should be discussed in more detail, useful or not for cellular hosts?
- IPv6 Router Alert Option - since a cellular host will not function as a router, there is no need to implement the receiver side of the router alert option
- Elaborate on why RFC-3041 is incompatible with 3GPP Addressing mechanism + add reference to appendix A.
- Mobility Support in IPv6 - needs elaboration on when communication benefits from route optimization.
- Fast Handovers in Mobile IPv6 - if MIPv6 is supported and when communication benefits from this optimization.
- Appendix B Transition Issues – should we discuss RFC 2529 (Transmission of IPv6 over IPv4 Domains without Explicit Tunnels)?

Next Steps

- Capture comments received.
- Update with regards to updated drafts.
- Get comments from the IPNG WG to ensure that the proposed functionality set is consistent, interoperable with the rest of the IPv6 Internet, complete and does not open new security risks.
- Now is the time to do this work. This is applicable for Release 5 of 3GPP, which is planned to be ready December 2001.
- Can this be considered as a working group draft?



**Thank you
&
Questions?**

Some Questions

- Q: What about Mobile IP and route optimization?
- A: You can implement it but it is optional.
- Q: Why is the routing functionality excluded from the cellular host?
- A: We focus on end-to-end connections in this draft. Routing functionality is important, and should be considered in a separate draft.
- Q: Why can't a prefix be allocated for the cellular host
- A: All networks may not support this.
- Q: Is RFC 2529 ("6over4") applicable for a cellular host
- A: Not very relevant transition method for a cellular host. Network environment (IPv4 multicast infra required), especially not for a cellular host implementation.

Core IP Specifications

- **RFC1981** Path MTU Discovery for IP version 6
- **RFC2373** IP Version 6 Addressing Architecture
- **RFC2374** An IPv6 Aggregatable Global Unicast Address Format
- **RFC2460** Internet Protocol Version 6
- **RFC2461** Neighbor Discovery for IPv6
- **RFC2462** IPv6 Stateless Address Autoconfiguration
- **RFC2463** Internet Control Message Protocol (ICMPv6) for the IPv6
- **RFC2472** IP version 6 over PPP
- **RFC2473** Generic Packet Tunneling in IPv6 Specification
- **RFC2710** Multicast Listener Discovery (MLD) for IPv6
- **RFC2711** IPv6 Router Alert Option
- **RFC2893** Transition Mechanisms for IPv6 hosts and routers
- **RFC3041** Privacy Extensions for Stateless Address Autoconfiguration in IPv6
- **RFC3056** Connection of IPv6 Domains via IPv4 Clouds
- **draft-ietf-dhc-dhcpv6-18.txt** - Dynamic Host Configuration Protocol for IPv6
- **draft-ietf-ipngwg-default-addr-select-03.txt** - Default Address Selection for IPv6
- **DNS RFC1034, RFC1035, RFC1886; RFC2874**

IP Security Specifications

- **RFC2104** **HMAC: Keyed-Hashing for Message Authentication**
- **RFC2401** **Security Architecture for the Internet Protocol**
- **RFC2402** **IP Authentication Header**
- **RFC2403** **The Use of HMAC-MD5-96 within ESP and AH**
- **RFC2404** **The Use of HMAC-SHA-96 within ESP and AH**
- **RFC2405** **The ESP DES-CBC Cipher Algorithm With Explicit IV**
- **RFC2406** **IP Encapsulating Security Payload (ESP)**
- **RFC 2407** **The Internet IP Security Domain of Interpretation for ISAKMP**
- **RFC2408** **Internet Security Association and Key Management Protocol**
- **RFC2409** **The Internet Key Exchange (IKE)**
- **RFC2410** **The NULL Encryption Algorithm and its Use With IPsec**
- **RFC2411** **IP Security Document Roadmap**
- **RFC2451** **The ESP CBC-Mode Cipher Algorithms**
- **IP Security Remote Access**
- **draft-ietf-ipsec-ciph-aes-cbc-01.txt - The Candidate AES Cipher Algorithms and Their Use with IPsec**
- **draft-arkko-icmpv6-ike-effects-00.txt - Effects of ICMPv6 on IKE and IPsec Policies**

IP Mobility Specifications

- [draft-ietf-mobileip-ipv6-13.txt](#) - Mobility Support in IPv6
- [draft-ietf-mobileip-fast-mipv6-01.txt](#) - Fast Handovers for Mobile IPv6 *
- [draft-ietf-mobileip-hmipv6-03.txt](#) - Hierarchical MIPv6 Mobility Management

The need for Mobile IPv6 MN functionality

	Other mechanism(s) for the intra-domain mobility / no changing CoA	MIP used for intra-domain mobility / CoA changes
Cellular interface(s) only	-	X
Additional non-cellular interface(s), e.g. WLAN	X	X
X = Mobile IPv6 MN functionality needed		
- = Mobile IPv6 MN functionality not necessarily needed		

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