Introduction to the Internet Area

IETF94 Yokohama

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What do we want to cover

• Background
• Overview of the working groups
• Brief summaries of the working groups
• Pointers to some of the important documents relevant to the area
• How to find further information?
The Internet Area in numbers

- 19 of the 136 (14%) active IETF working groups
- 31 of the 223 (14%) RFCs published this year
- 2 of the 15 (13%) of the Area Directors
Core Protocols

• IP (IPv4 and IPv6)
• DNS
• DHCP (DHCPv4 and DHCPv6)
• Mobile IP (MIPv4 and MIPv6)
• NTP
Broad technical areas

- Core protocols including IP, DNS, host and router configuration
- Mobility and Multihoming
- IPv4/IPv6 transition and co-existence
- Low power networks and IoT
- Time related protocols
WG's by technology area

- **Time**
  - tictoc
  - ntp

- **Transition**
  - pcp
  - softwire
  - sunset4

- **Core**
  - 6man
  - dhc
  - dnssd
  - savi

- **Low power**
  - 6lo
  - lwig

- **MM**
  - mif
  - hip
  - dmm
  - netext
By phase of work

- Starting up: dnssd, 6lo, 6tisch
- Working steady: mif, dhc, hip, 6man, lwig, tictoc, intarea, pcp, sunset4, homenet, softwire, netext
- Winding down: savi
6lo focuses on the work that facilitates IPv6 connectivity over constrained node networks

Main areas of work
- IPv6-over-<link> adaptation layer specifications for link layer technologies used in constrained node networks
- Information and data models (e.g., MIB modules, YANG models) for these adaptation layers
- Common mechanisms such as low-complexity header compression, that are applicable to more than one adaptation layer specification
- Maintenance and informational documents required for the existing IETF specifications in this space (e.g. work from the erstwhile 6lowpan wg)
The 6man working group is responsible for the maintenance, upkeep, and advancement of the core IPv6 protocol specifications.

It is the design authority for extensions and modifications to the IPv6 protocol.

Reviews and signs off on documents produced in other working groups that extend or modify the IPv6 protocol.
6tisch

IPv6 over the TSCH mode of IEEE 802.15.4e

• The IEEE802.15.4e Time-slotted Channel Hopping (TSCH) is a recent amendment to the IEEE802.15.4 MAC

• The 6tisch working group works on defining IPv6 over TSCH in order to enable the further adoption of IPv6 in industrial standards

• Currently limited to working on distributed routing over a static schedule
  – May work on a dynamic schedule in the future
The dhc working group is one of the oldest working groups in the IETF (Originally chartered in 1991 😊)

It is tasked with

- Developing extensions to the DHCPv6 infrastructure as required to meet new applications and deployments
- Documenting operational considerations for the wider community
- Maintenance and upkeep of the core DHCP specifications
- Reviewing DHCP options defined in other WGs in association with the Internet Area Directorate
The dmm working group specifies Distributed Mobility Management solutions for IP networks so that traffic between mobile and correspondent nodes can take an optimal route.

It is also chartered to work on maintenance and bug fixes of the specifications in the Mobile IPv6 protocol family.
The DNS-SD [RFC 6763] and mDNS [RFC 6762] protocol suite (aka Apple Bonjour) is widely used for DNS-based service discovery and host name resolution on a single link.

There are several use cases such as multi-link residential, campus, and enterprise networks where it could be useful to use to discover services on remote links.

Unfortunately, the mDNS protocol is constrained to link-local multicast scope by design, and therefore cannot be used to discover services on remote links.

The focus of the dnssd working group is to develop a solution for extended, scalable DNS service discovery.

- Document requirements for such a solution under selected scenarios
- Develop an improved, scalable solution for service discovery that can operate in multi-link networks
- To document challenges and problems encountered in the coexistence of zero configuration and global DNS name services in such multi-link networks
The dprive working group develops mechanisms to provide confidentiality to DNS transactions, to address concerns surrounding pervasive monitoring.

Primary focus of this Working Group is to develop mechanisms that provide confidentiality between DNS Clients and Iterative Resolvers.

- At a later time the wg may also consider mechanisms that provide confidentiality between Iterative Resolvers and Authoritative Servers.

Attempts to maintain backward compatibility with legacy DNS implementations as well as minimize application-level changes.
The Host Identity Protocol (HIP) provides a method of separating the end-point identifier and locator roles of IP addresses.

The HIP architecture and protocol mechanisms had been published as Experimental RFCs.

- Effects of the protocol on applications and on the Internet as a whole were not known.
This working group focuses on the evolving networking technology within and among relatively small residential networks
- Designed to work on residential networks involving multiple routers and subnets
- Mainly focused on IPv6 based operation

Focused on meeting the following requirements
- Prefix configuration for routers
- Managing routing
- Name resolution
- Service discovery
- Network security

Architectural principles have been specified
- Protocol work is ongoing
- Selection of a routing protocol for use in homenet is also ongoing
Internet Area Working Group

• Serves primarily as a forum for discussing far-ranging topics that affect the entire area
  – Share information about ongoing activities in the area
  – Create a shared understanding of the challenges and goals for the area
  – Point of co-ordination

• Also works on development and publication of one-off RFCs that do not justify the formation of a new working group
  – Either not in scope of an existing working group
  – Or relevant to more than one INT area working group
The LWIG working group focuses on collecting and documenting experiences from implementers of IP stacks in constrained devices

- implementation techniques for reducing complexity, memory footprint, or power usage
Multiple Interfaces

• The purpose of the MIF working group is to describe how devices can attach to and operate in multiple networks

• It works on defining a consistent approach (MPVD – multiple provisioning domains) and recommended practices for handling sets of network configuration objects by hosts attached to multiple networks.
  – The MPVD architecture has been published
  – The protocol extensions to IPv6 neighbor discovery and to DHCPv6 are ongoing
  – Working on an API so that applications can request information associated with specific provisioning domains
Proxy Mobile IPv6, specified in RFC 5213, is a network-based mobility protocol.

The netext working group is chartered to work on some key extensions to PMIPv6:
- Localized Routing
- Bulk Refresh
- Load Balancing and Reliability of the mobility anchors

Work has mostly been completed and the wg is winding down.
The Network Time Protocol synchronizes clocks across a network. It is one of the oldest and most widely deployed protocols on the Internet. The NTP working group maintains the Network Time Protocol specifications. Current efforts include:

- maintenance of NTPv4 specifications (e.g. extension header clarifications)
- development of Network Time Security (replacement for Autokey)
- documentation of Best Current Practices
- development of a YANG module
- collection of requirements for next steps for NTP
Port Control Protocol

• Focused on standardizing a client/server protocol to enable an explicit dialog with a middleboxes (e.g. NATs or firewalls)
  – Allows the opening up and/or forwarding of TCP and UDP ports, regardless of the middlebox’s location
  – Supports off-link middleboxes (unlike UPnP or NAT-PMP)
Source Address Validation Improvements

• Focuses on standardizing mechanisms that prevent nodes attached to the same IP link from spoofing each other's IP addresses
  – Similar to BCP38 ingress filtering but on a single IP link
• Work has been mostly completed and wg will be closed soon
Softwires

- Focuses on the specification of IPv4-IPv6 transition and co-existence mechanisms that are based on encapsulation (i.e. tunneling)
  - Discovery, control and encapsulation methods for connecting IPv4 networks across IPv6 networks and vice versa
  - Management mechanisms for these methods (e.g. provisioning, MIBs, RADIUS etc.)
  - Implementation considerations for handling selection and use of one of these transition/co-existence solutions
- Work has been mostly completed and wg will be closed or rechartered soon
sunset4

Sunsetting IPv4

• Focuses on doing works that facilitates the graceful "sunsetting" of the IPv4 Internet in areas where IPv6 has been deployed
  – Includes identifying specific areas of concern, providing recommendations, and standardizing protocols
tictoc

Timing over IP Connection and Transfer of Clock

• The Timing over IP Connection and Transfer of Clock (tictoc) working group was chartered to look at next generation time synchronization protocols

• Current efforts include:
  – Security requirements for time synchronization protocols
  – IEEE 1588 Enterprise profile
  – Experimental draft on 1588 over MPLS networks
  – Experimental multipath synchronization technique
  – IEEE 1588v2 management (MIB and YANG modules)
Internet Area Directorate
INT Dir

• The Internet Area Directorate is an advisory group of experts selected by the Internet Area Directors.

• Reviews documents as and when requested by the INT Area Directors.

• Mentor newer IETF participants
  – Identify participants who have the potential to be useful, contributing members to the directorate and
  – Help them with exposure/tutoring from more experienced IETF participants
Closely aligned areas

- **OPS**
  - IPv6 adoption/transition/co-existence
  - MIB & Yang model development
  - AAA (RADIUS and DIAMETER) support

- **RTG**
  - Interactions between IP and Routing protocols
  - Home networking

- **SEC**
  - Security Considerations, DNSSEC, Network Access Control
Pointers to background reading

- IPv4 – RFC 791
- IPv6 – RFC 2460*, RFC 4861, RFC 4862
- DNS – RFC 1035
- DHCPv4 – RFC 2131
- DHCPv6 – RFC 3315
- MIPv4 – RFC 5944
- MIPv6 – RFC 6275
- NTP - RFC 5905

* In the process of being updated
For further information

• Current list of wgs in the Internet Area
  http://datatracker.ietf.org/wg/#int

• Information about a specific working group
  – Mailing list information and archives
  – Charter, milestones and deliverables
  – Associated documents...
  http://datatracker.ietf.org/wg/<wg_name>/
### IPv6 Maintenance (6man)

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<tr>
<td>Active Internet-Drafts</td>
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<td>Recommendation on Stable IPv6 Interface Identifiers</td>
<td>10 pages</td>
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<td>draft-ietf-6man-deprecate-atomfrag-generation-03</td>
<td>2015-07-04</td>
<td>I-D Exists</td>
<td>WG Document</td>
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<tr>
<td>Deprecating the Generation of IPv6 Atomic Fragments</td>
<td>10 pages</td>
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<tr>
<td>draft-ietf-6man-ipv6-address-generation-privacy-08</td>
<td>2015-09-25</td>
<td>RFC Ed Queue: EDIT for 27 days</td>
<td>Brian Haberman Ole Troan</td>
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<tr>
<td>Privacy Considerations for IPv6 Address Generation Mechanisms</td>
<td>18 pages</td>
<td>Submitted to IESG for Publication: Informational</td>
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### RFCs

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<tr>
<td>RFC 5172 (was draft-ietf-ipv6-compression-nego-v2)</td>
<td>2008-03</td>
<td>Proposed Standard RFC</td>
<td>Jari Arkko</td>
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<td>Negotiation for IPv6 Datagram Compression Using IPv6 Control Protocol</td>
<td>7 pages</td>
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<td>RFC 5453 (was draft-ietf-6man-reserved-ids)</td>
<td>2009-02</td>
<td>Proposed Standard RFC</td>
<td>Jari Arkko</td>
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<td>Reserved IPv6 Interface Identifiers</td>
<td>6 pages</td>
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<td>RFC 5722 (was draft-ietf-6man-overlap-fragment)</td>
<td>2009-12</td>
<td>Proposed Standard RFC</td>
<td>Jari Arkko</td>
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<td>Handling of Overlapping IPv6 Fragments</td>
<td>6 pages</td>
<td>Updated by RFC6946</td>
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<tr>
<td>RFC 5871 (was draft-ietf-6man-iana-routing-header)</td>
<td>2010-05</td>
<td>Proposed Standard RFC</td>
<td>Ralph Droms</td>
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<tr>
<td>IANA Allocation Guidelines for the IPv6 Routing Header</td>
<td>3 pages</td>
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Example working group information

Contacts
Mailing list
Info
Archives
Remote participation
Questions?
Acknowledgments

• Thanks to Mirjam Kuehne, Karen O’Donoghue, Alice Russo, Brian Carpenter, Scott Bradner and all the wonderful folks on the EDU team for their contributions and feedback
Links

• You can find these slides at

• Please spend a minute to take a survey about this presentation
  – [https://www.surveymonkey.com/r/94internetarea](https://www.surveymonkey.com/r/94internetarea)
  – The EDU team (and I) would love to hear your views