IETF ROUTING AND MPLS STANDARDS UPDATE

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MPLS 2004

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Context

- What happened within IETF RTG and SUB-IP areas in last 2 years
- Where we are with standardization (RTG, MPLS, CCAMP, L2VPN, L3VPN)
- New efforts in IETF RTG area

Format

- For each block
  - Recently approved
  - Almost there
  - In progress
  - New work

IETF Sub-IP Area

- SUB-IP area was established as a temporary area for sub-ip efforts (MPLS, GMPLS, VPNs)
- As MPLS/GMPLS became a streamline IETF technology, more cooperation with permanent areas was needed
- WGs from SUB-IP were moved to primary areas
- TEWG remains in SUB-IP, but will conclude soon

IETF RTG Area

- Currently 14 WGs. Since 2002:
  - Concluded: 4 (MSDP, RIP, BGMP, UDLR)
  - New: 3 (RPSEC, RTGWG, BFD)
- Document statistics (since 2002, includes SUB-IP):
  - 45 RFCs published (20 STD, 4 EXP, 21 INFO)
  - 20 docs in RFC-Ed queue (12 STD, 2 EXP, 6 INFO)

IP Routing: recently approved

- ISIS:
  - Graceful restart (RFC3847)
  - Interop update (RFC3787, RFC3719)
  - TE (RFC3784)
- OSPF:
  - Graceful restart (RFC3623)
  - TE (RFC3630), GMPLS TE (rfc-ed)
  - NSSA update (RFC3101)
- BGP :
  - Route oscillations (RFC3345)
  - Capability announcement (RFC3392)
  - Security requirements for MD5 keys (RFC3562)

IP Routing: recently approved (cont.)

- Mcast:
  - SSM Overview (RFC3569),
  - PIM-DM rev (rfc-ed),
  - MSDP (RFC3618)
  - BGMP (rfc-ed)
  - IGMPv3 (RFC3376)
- RPSEC:
  - Generic threats analysis (rfc-ed)

IP Routing: almost there

- ISIS:
  - P2P LAN links
  - Experimental TLVs
- OSPF:
  - Scalability recommendations
  - Refresh reduction*
  - OSPFv3 authentication
  - MIB update

IP Routing: almost there (cont.)

- BGP:
  - BGP4 spec update (!)
  - Extended communities
  - RR spec update
  - Graceful restart
  - Cease subcode
  - MP-BGP spec update
- Mcast:
  - SSM architecture
  - PIM-SM rev
  - PIM-Bidir
  - PIM-Anycast-RP
  - DVMRPv3

IP Routing: new work

- BFD WG:
  - Chartered to produce an Internet Standard specification for a Bidirectional Forwarding Detection Protocol
- RTGWG:
  - Chartered to be a home for small routing-related projects, such as:
    - GTSM (Generalized TTL Security Mechanism)
    - TE shortcuts in IGPs *(RFC3906)
    - IP Fast Reroute

IP Routing: BFD

- A generic failure detection mechanism that
  - detects failures between adjacent forwarding engines…
- And is:
  - Fairly fast (allows subsecond detection)
  - Media-independent
  - Low-overhead (for efficient HW implementation)
- For more info see:
  - http://www.ietf.org/html.charters/bfd-charter.html
  - draft-ietf-bfd-*

IP Routing: IP FRR

- Fast rerouting mechanism for pure-IP (non-MPLS) networks
  - Pre-calculate back-up next hops and make them ready for forwarding (pre-install)
  - Avoid black-holes by switching to back-ups in case of failure
  - Backups calculated so that using them is safe even before the normal reconvergence is completed
  - Avoid rerouting micro-loops
- Basic and advanced methods (and specs)
- For more info see:
  - http://www.ietf.org/html.charters/rtgwg-charter.html
  - draft-ietf-rtgwg-ipfrr-*

MPLS: STD status

- Recently approved
  - LDP graceful restart (RFC3478) and fault tolerance (RFC3479)
  - LDP MTU extensions (rfc-ed)
  - MPLS recovery framework (RFC3469)
  - MPLS MIB modules (RFC3811-3815)
- Almost there:
  - MPLS Fast Reroute*
  - MPLS in IP/GRE*

MPLS: cont.

- In progress
  - MPLS OAM requirements
  - MPLS LSP Ping:
  - Requirements for P2MP TE LSPs
  - MPLS explicit NULL label
- New work:
  - Multi-area/AS MPLS TE (with CCAMP)
  - BCP on MPLS load sharing

GMPLS: STD status

- Recently approved:
  - GMPLS Architecture (rfc-ed)
  - GMPLS signaling (RFC3471-3473)
  - GMPLS routing (rfc-ed)
  - GMPLS tunnel tracing requirements (RFC3609)
  - LMP spec (rfc-ed)
  - LMP for SONET/SDH and WDM (rfc-ed)
  - GMPLS egress interface control (rfc-ed)

GMPLS: cont.

- In progress:
  - GMPLS MIB modules
  - GTTP (generic tunnel tracing protocol)
  - Generalized inter-area/AS TE extensions
  - Signaling for G.709 networks
  - Signaling and routing for ASON networks

MPLS: new work

- Path Computation Elements (PCE) BOF
  - PCE—an element assisting the head-end LSR in computing paths through parts of the network invisible to it
  - BOF at IETF60 showed a lot of interest
  - Currently working on the framework
  - 2nd BOF at IETF61 to discuss architecture and need for a WG

RTG Area: plans

- Complete the BGPv4 spec update
- Complete current PIM and SSM work
- Start a WG on securing inter-domain routing in the Internet
- Close IDMR WG

VPNs: organization

- Work originally hosted in PPVPN WG in SUB-IP
- PPVPN was split:
  - L3VPN: MPLS/BGP VPNs (2547bis), VR-based, CE-based
  - L2VPN: VPLS, VPWS, IP-only L2VPNs

L3VPN: STD status

- Recently approved:
  - Generic requirements for provider-provisioned VPNs (RFC 3809)
  - Service requirements for L3 VPNs (rfc-ed)
  - Framework for L3 VPNs (rfc-ed)
- Almost there:
  - 2547bis
  - OSPF as PE-CE
  - 2547bis over IP/GRE
  - L3 VPN security framework
  - Terminology

L3VPN: cont.

- In progress:
  - Multicast support
  - IPv6 support
  - CE-based, VR-based VPNs
  - PE-PE IPsec for 2547bis
  - Constrained route distribution

L2VPN: STD status

- Recently approved:
  - Framework for L2 VPNs (rfc-ed)
- In progress:
  - LDP-based VPLS spec
  - BGP-based VPLS spec
  - IPLS, ARP mediation
  - VPLS OAM requirements and framework

PWE3: STD status

- Recently approved:
  - PWE3 Requirements (RFC3916)
  - PWE3 Architecture
- Almost there:
  - Ethernet encaps
  - ATM encaps
  - Requirements for TDM circuit emulation
  - Structure-agnostic TDM over packets (SATOP)

Thank you!