

# Evolution of IGMP/MLD standards status

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v1.0

# Problem statement

- IGMPv1/IGMPv2/IGMPv3, MLDv1/MLDv2 (and more)
  - All at some level of Internet Standard
  - Levels do not align with our desire for nodes to implement latest versions
    - **Primarily to ensure we do not proliferate non-SSM capable implementation**
  - Could/should we make old specs “HISTORIC” ?
    - Or otherwise downgrade them ? (what other operations are there ?)
- Operators think:
  - They do not need IGMPv3/MLDv2 as long as they do not need SSM
    - True. But they also get other benefits from MLDv2/MLDv3:
    - Explicit tracking == faster leave latencies (oops, we have a problem with that draft too)
    - More subtle benefits... good reason to summarize in new informational doc ?
  - They think IGMPv3/MLDv2 will not support standard IP Multicast (ASM) and not be backward compatible
    - Wrong! Full backward compatible. Can mix IGMPv2/IGMPv3 routers (queriers) and hosts “arbitrarily”
    - But any upgrade is a risk of course. We have seen bugs in the past
      - Personal experience: defaultet router side to IGMPv2 for long time before changing default to IGMPv3
      - Primarily because of snooping switches inability to support IGMPv3 for a long time (... <= 2010 ?)

# NOT CHANGING ASM IN THIS WORK

- Should not touch FULL INTERNET STANDARD status of ASM in this work
- Parallel effort for demoting ASM FOR INTERDOMAIN
  - draft-acg-mboned-multicast-models
- Just make sure the demoting ASM FOR INTERDOMAIN is released as RFC so that it supersedes anything else we do here.
  - E.g.: what these slides propose in the following slides
- Important, business critical deployments of intradomain ASM exist
  - But little visibility in IETF. “All enterprises”
  - Best deployments (IMHO): Bidir-PIM based (no (S,G) state needed)
    - Nothing that SSM could do equally well (state scaling).
  - But majority of intradomain ASM uses PIM-SM, which is ok...
    - Many cases this could be done better with SSM, but its an app issue
    - Hopefully demoting ASM intradomain will help application evolution and that impacts enterprises too. If not, we can start to force that issue later.

## Relevant document and possible status ?

- RFC1112 (IPv4 ASM + IGMPv1) (full) STANDARD
  - Problem: IMHO, we can not downgrade this because it does not only specify IGMPv1, but also IPv4 ASM service model (joingroup/leavegroup)
  - Possible solution:
    - New RFC that superceeds RFC1112, keeps specifying the ASM service interface, removes IGMP. TBD: Check how easily we can cut without rewrite.
    - Main issue: There is no ASM service interface spec for IPv6 and we would not be permitted to write a new IPv4 only doc (also does not make sense), aka: would need to change language to IPv4/IPv6.
    - No idea what ADs would think of this, and if we can immediately get that spec to be full INTERNET STANDARD (given how it is just textual clarification and removal of historic IGMPv1).
- RFC2236 (IGMPv2) PROPOSED STANDARD
  - Easy to downgrade to HISTORIC ?
  - “Oh, so IGMPv1/RFC1112 is better than IGMPv2 ? Aka: unclear how much HISTORIC helps here if we do not solve the RFC1112 issue also”

## Relevant documents and possible status ?

- RFC3376 (IGMPv3) PROPOSED STANDARD
  - If IGMPv1 was FULL internet standard for many years after anybody used it (long after IGMPv2 was out), we should be able to easily upgrade IGMPv3 to (full) INTERNET STANDARD.
  - Q: what do we need to do for that ? Any AD in the room ?
- RFC2710 (MLDv1) PROPOSED STANDARD
  - Note that there is no document specifying ASM service model for IPv6 (as RFC1112 is for IPv4 (without using the term ASM)).
  - Should be easy to demote to HISTORIC ?!
- RFC3810 (MLDv1) PROPOSED STANDARD
  - ~~Please do not use IPv6, only IPv4 has a full Internet Standard protocol (RFC1112)~~
  - Upgrade to (full) INTERNET STANDARD. Same Argument as IGMPv3

## Relevant documents and possible status ?

- RFC4604 (IGMPv3/MLDv2 for SSM) PROPOSED STANDARD
  - Update to (full) STANDARD
  - This would be the normative reference for the SSM service model, we do of course want a full STANDARD for SSM
- RFC3590 (address selection for for MLD PROPOSED STANDARD)
  - TBD: Unclear if this is now standard in implementations. If so, then update to (full) STANDARD too.
- RFC5790 (lightweight IGMPv3/MLDv2 PROPOSED STANDARD)
  - Suggest to not change status.
  - Functionally a good progression of IGMPv3/MLDv2 (remove all unneeded complexities from IGMPv3/MLDv2). But: Not sure if there is enough implementations/deployment experience to make it full standard
  - If we need to ask for implementations etc. for any of this work, we should include asking for RFC5790 support as well to vet this.

# Summary ?!

- Figure out if we should/can update/split RFC1112 to a) demote IGMPv1 and b) have a specification of ASM for IPv4/IPv6 without any signaling protocol tied to it.
- Figure out what we need to do to reclassify (HISTORIC/STANDARD) the other protocols (no text changes)
- Have an informational PIM and/or Mboned document outlining this process ?
  - Even though this is all PIM Work, an Mboned document might allow more freedom to discuss operational considerations
  - E.g.: discussing interop and procedures to mitigate bad/old components.

# Adjacent work

- Did not have time to revisit in detail all specs.
  - The following issue came up talking with customer that was using Bidir-PIM with IGMPv2 and discuss moving to IGMPv3:
- Fear that documents are inconsistent and not strongly recommendation how MLD/IGMP and Routing (PIM) should integrate.
- What happens with (SSM) INCLUDE( $G, \{S\}$ ) membership reports ?
  - For a PIM-SM group ?
    - One implementation just creates ( $S, G$ ) but no ( $*, G$ ) state. Great for doing SSM in ASM address space.
    - One implementation just creates ( $*, G$ ) state, ( $S, G$ ) state is created by normal PIM-SM procedures. ( $S', G$ ) packets (from other sources  $S'$ ) may then be filtered on last-hop. Great if PIM-SM RP has source-filtering procedures: direct creation of ( $S, G$ ) would bypass them.
  - For a Bidir-PIM group ?
    - The only interoperable option is to create ( $*, G$ ) state. Last hop router MAY then discard ( $S', G$ ) traffic for non-included  $S'$ .
- Any opinions how we could best standardize predictable behavior
  - Need to identify in more detail what our specs exactly say..
  - Pretty sure there is nothing said about EXCLUDE( $G, \{S\}$ ) – but we may want to explicitly say that there is no expectation to support this, so that we could evolve from IGMPv3/MLDv2 over to RFC5790 whenever we feel it is widely enough adopted and proven

**Thank You!**