

# Status of IPv6 SSM

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# Introduction

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- <http://domen.uninett.no/~venaas/ssmstatus.pdf>

# IPv6 and multicast

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- IPv6 gives a new chance at deploying multicast
  - All IPv6 hosts support multicast
  - No NATs
  
- Broadband user can e.g. stream video to thousands of people
  - Requires both IPv6 and multicast
  
- More content and services available to everyone on the Internet
  
- Multicast has generally been difficult to deploy and manage
  - SSM helps

# What is SSM

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- Traditional multicast (Any-Source Multicast)
  - Receivers join a group G
  - Sources send packets addressed to G
  - All members receive them
  - Network takes care of the rest
  - Independent "sessions" should use different G
  
- Source-Specific Multicast
  - Receivers explicitly join sources, (S1,G), (S2,G), ...
  - Sources send packets addressed to G
  - Receiver only receives from the sources it joined
  - Independent "sessions" can use same G, but not same (S,G)
  - Receiver needs to learn what sources to join, not just G
  
- Some IPv4 and IPv6 group ranges are for SSM only
- Other ranges can be used for both ASM and SSM
  - Some can join (S,G) and only receive S
  - Others can at the same time join G and receive all sources

# Why SSM

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- Removes complexity from network
  - No Rendezvous-Points, hence no need for BSR, MSDP etc.
  - Always use PIM Shortest Path Trees, easier to debug
  
- Hence easier to deploy and manage
  
- More secure
  - Only receive packets from specified sources
  - For e.g. tv broadcast you join a specific source
  - You will not receive packets other sources send to group
  
- Hence better suited to typical broadcast use
  
- Why not SSM
  - More complexity in hosts/applications (source discovery)
  - Always per-source state in routers

# SSM and PIM routers

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- SSM works with PIM-SM routers as is
  - Shortest Path Trees part of PIM-SM
  
- However, additional requirements for SSM group ranges
  - Must not accept (\*,G) joins for G in SSM range
    - ▷ No shared tree
  - Routers must not send PIM register to RP
  - An RP must not accept PIM register
  - Or, simply not allow group-to-RP mapping for SSM G
    - ▷ With new PIM spec the above then follows
  
- SSM still works without requirements
  - But, want to enforce SSM-only use for SSM group ranges
  
- I think all current PIM-SM routers meet the requirements
  
- In addition edge routers need to support MLDv2 (IGMPv3)

# SSM and MLDv2

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- Edge routers need to support MLDv2
  - IGMPv3 for IPv4
  
- Many routers now support this with recent software
  - Cisco, Juniper, \*BSD with pim6sd
  - Not yet XORP I think
  - Not sure of others
  
- MLDv2 allows listener to specify either
  - Interest in only specific sources for a group
  - Interest from all but specific sources
    - ▷ Blocking specific sources
  
- Some issues seen with routers and hosts using different ICMPv6 protocol numbers for MLDv2
  - Now assigned by IANA and specified in RFC 3810

# SSM support in operating systems

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- MLDv2 needs to be implemented in host; available in
  - Recent Linux kernels
  - FreeBSD with KAME patches
  - Solaris 10 pre-release
  - Others?
  
- Hosts need to provide API to applications, RFC 3678
  - More or less ok for all the above
  - Linux only part of API and only in kernel header files
  - Sample Linux code: <http://www.uninett.no/testnett/multicast/mctest/>
  
- API allows both joining and blocking sources
- Contains protocol independent functions
  - Useful also for protocol independent code joining G
  
- No support needed for sending multicast

# SSM applications

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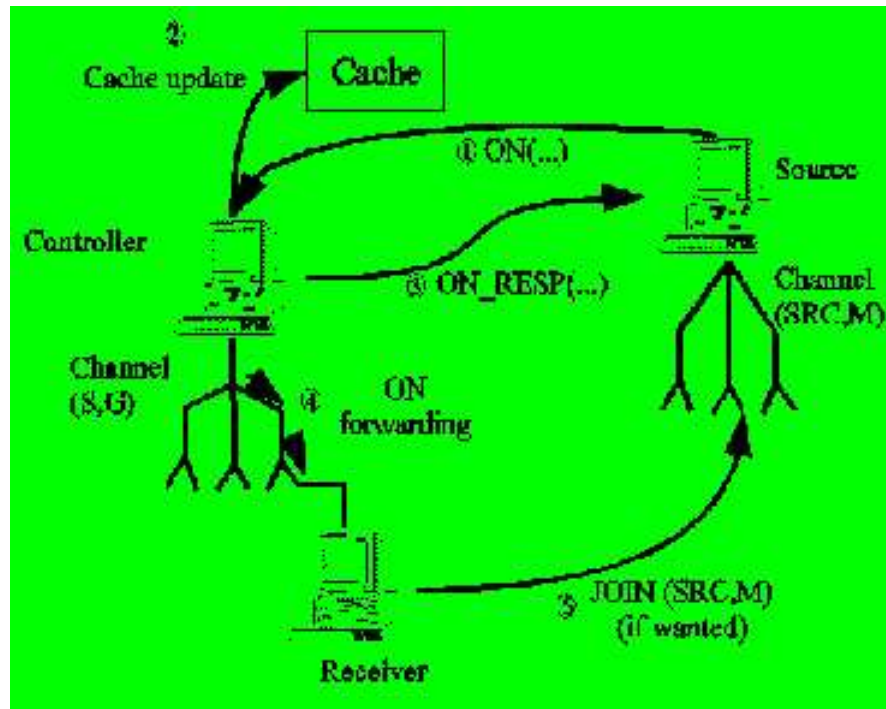
- Very few IPv6 applications available, a few more with IPv4
  - Any multicast application can send SSM, nothing special
  
- KAME utilities, mcastsend, mcastread
  
- PSNC did some tests and have some patches
  - <http://amorpha.ipv6.man.poznan.pl/ssm/>
  - dtms & dtmc, dvts & xdvshow, mad flute
  
- MAD Flute - <http://www.atm.tut.fi/mad/>
  - Reliable (FEC) multicast content delivery
  - Daily used with SSM in 6NET and M6Bone
  
- ssmsdpifier - <http://clarinet.u-strasbg.fr/~hoerdt/libssmsdp/>
  - Traditional multicast application turned into an SSM application
  - Works without changing code or binary
  - Tested with NLANR multicast beacon

# SSM and applications with dynamic sources

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- SSM easy for applications with a few static sources
  - In particular with 1
  - All sources are announced in advance
  - Receiver joins all sources
  
- SSM is difficult with dynamic sources
  - That is, sources that come and go during session
  - Needs to do source discovery in application
    - Replacing the RP functionality
  
- One solution is SSMSDP
  - Source Specific Multicast Source Discovery Protocol
  - Not standardized
  - Used by `ssmsdpifier`
  
- Another similar proposal is `draft-lehtonen-mboned-multissm-00.txt`

# SSMSDP and multissm concept



□ The basic idea is as follows:

- There is a controller C, and a control channel (C,G)
- (C,G) is announced and receivers join it
- Sources S regularly unicast a source announcement to C
- C regularly sends list of active sources on (C,G)
- Receivers receive announcements on (C,G) and join each (S,G)

# Emulating ASM with SSM

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- One can emulate ASM with SSMSDP or multissm
  - ssmsdpifier does this
  
- This works well for most applications
  
- One problem is that a session needs an owner
  - The one running the controller
  - Somehow make controller dynamic?
  - How to cope with long lasting or permanent sessions with no natural owner?
  
- ASM useful for some embedded use, service discovery etc
  - Group address can be fixed, not depending on local network addresses
  - It might be enough to do intra-domain ASM

# SSM testing

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- To take part in SSM tests together with 6NET and others you need multicast connectivity. This may require a tunnel to go through routers not supporting IPv6 multicast and a multicast BGP peering.
  
- Forum for collaboration <http://www.m6bone.net/>
  - mailing list, see [http://www.m6bone.net/article.php3?id\\_article=8](http://www.m6bone.net/article.php3?id_article=8)