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Lets talk about the IP multicast data plane

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How to implement IP multicast routing in Linux?
What has been done?

- Multicast forwarding in user space
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- Multicast forwarding in user space
  - Raw sockets
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- Multicast forwarding in user space
  - Raw sockets

  Pro: it works…
  Con: it doesn’t play nice

  (Policy Routing, Firewalls)
What has been done?

- Multicast forwarding in user space
  - Raw sockets
  - Tun/Tap interface
What has been done?

- Multicast forwarding in user space
  - Raw sockets
  - Tun/Tap interface

  Pro: easier to integrate
  Con: getting traffic flowing is complicated

  (IP multicast routes? Bridges?)
What has been done?

- Multicast forwarding in kernel space
What has been done?

- Multicast forwarding in kernel space
- IP multicast routing

Pro: Fast, integrated, plays nice!
Con: Doesn’t work for MANET
What has been done?

- Multicast forwarding in kernel space
- IP multicast routing

  Pro: Fast, integrated, plays nice!
  Con: Doesn’t work for MANET

Or does it?

(what new tools do we have?)
What's the trouble?

- Retransmission on same interface
- Selectively forwarding multicast (MPR?)
- Local traffic
- Supressing duplicates
What’s the trouble?

- Retransmission on same interface
  Seems to be working on modern Linux kernels!

- Selectively forwarding multicast (MPR?)
- Local traffic
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What’s the trouble?

- Retransmission on same interface
- Selectively forwarding multicast (MPR?)

Maybe some “dynamic” firewalling (needs Ethernet source)?

- Local traffic
- Supressing duplicates
What’s the trouble?

- Retransmission on same interface
- Selectively forwarding multicast (MPR?)
- Local traffic

Could be made easier with virtual Ethernet devices

- Supressing duplicates
What’s the trouble?

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We need custom code in the kernel… *sigh*
What’s the trouble?

- Retransmission on same interface
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We need custom code in the kernel…

Maybe just use XDP and eBPF?
Idea for multicast data plane

Incoming MANET interface

XDP drop/redirect with eBPF filter

Local traffic

veth pair

Firewall

Outgoing MANET interface

IP multicast routing
Idea for multicast data plane

Local traffic

Incoming MANET interface

XDP drop/redirect with eBPF filter

veth pair

eBPF:
- Ethernet header available
- Change TTL to prevent forwarding
- Use hash to drop duplicates

Firewall

IP multicast routing

Outgoing MANET interface
Questions?