batman-adv - Assessment & Lookout

Statistics from FF Hamburg and BATMAN Features to Come

Linus Lüssing

Freifunk Nord Conference Aug. 2014, Kiel

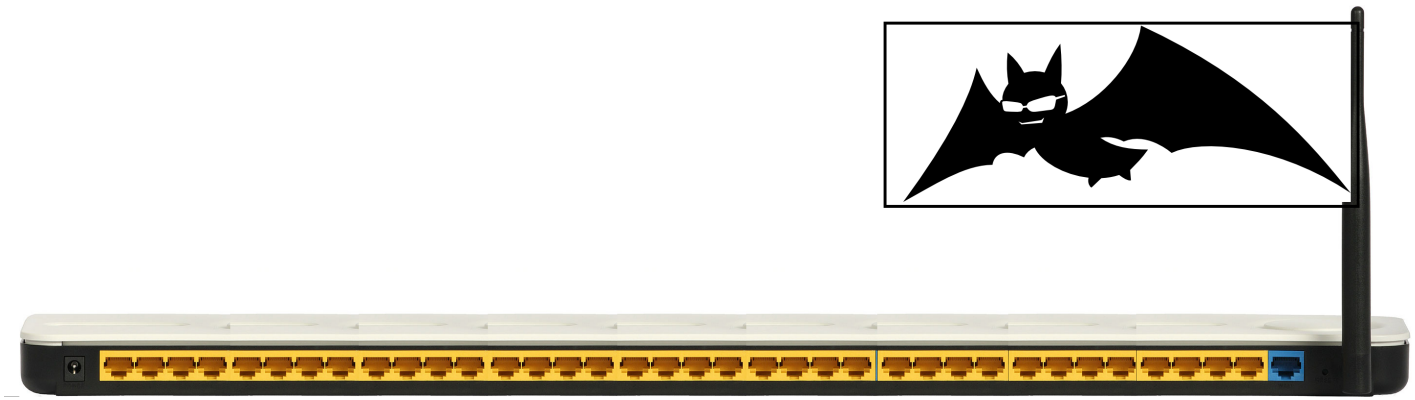
Outline

Outline

batman-adv: Big, Virtual Switch



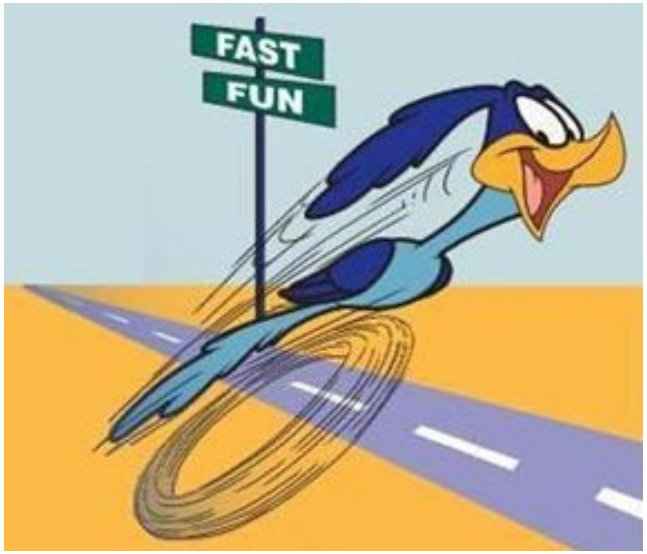

batman-adv: Big, Virtual Switch



Features

- Network layer agnostic: Supports IPv4, IPv6, ...
- Interface bonding
- Interface alternating
- Network coding

Features: Roaming



- Reactive and fast

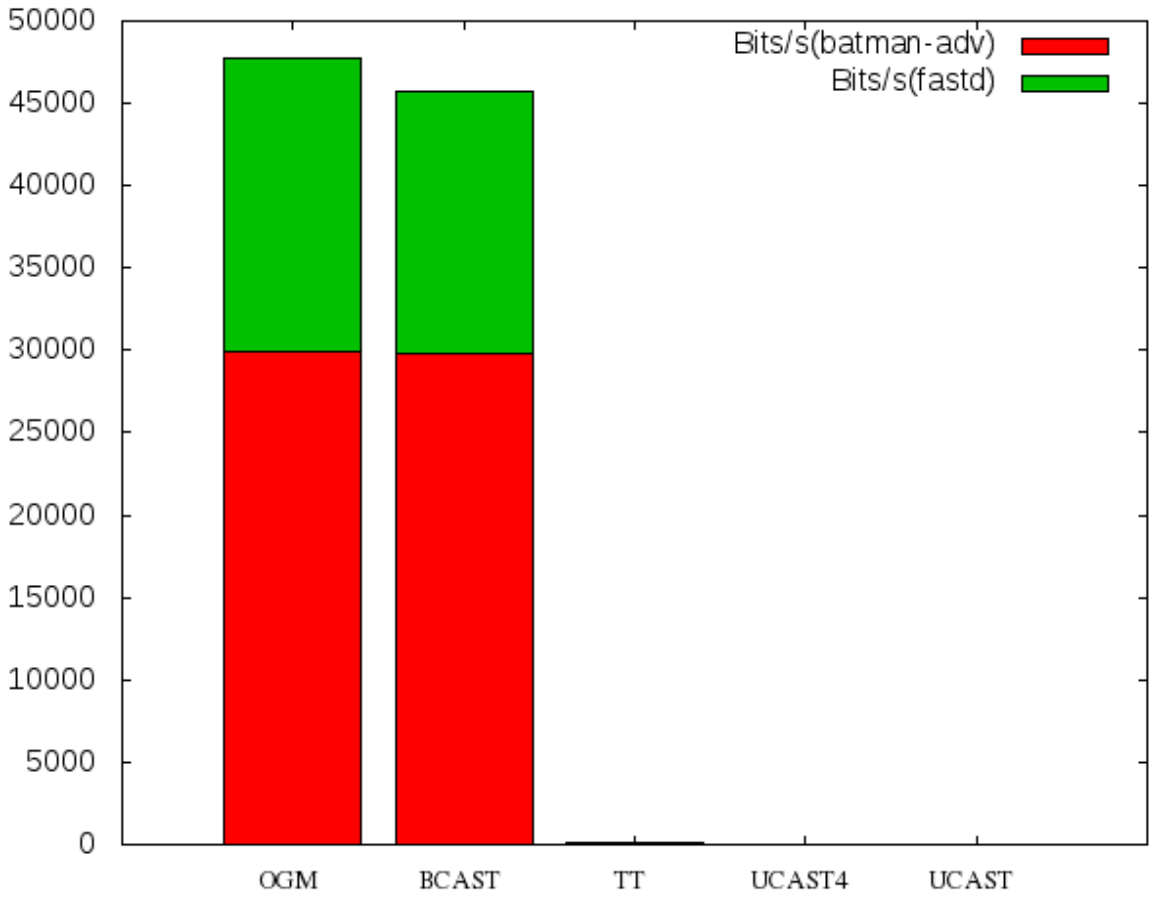
Layer 2 Mesh Networks - Scalability?

- Freifunk Hamburg:

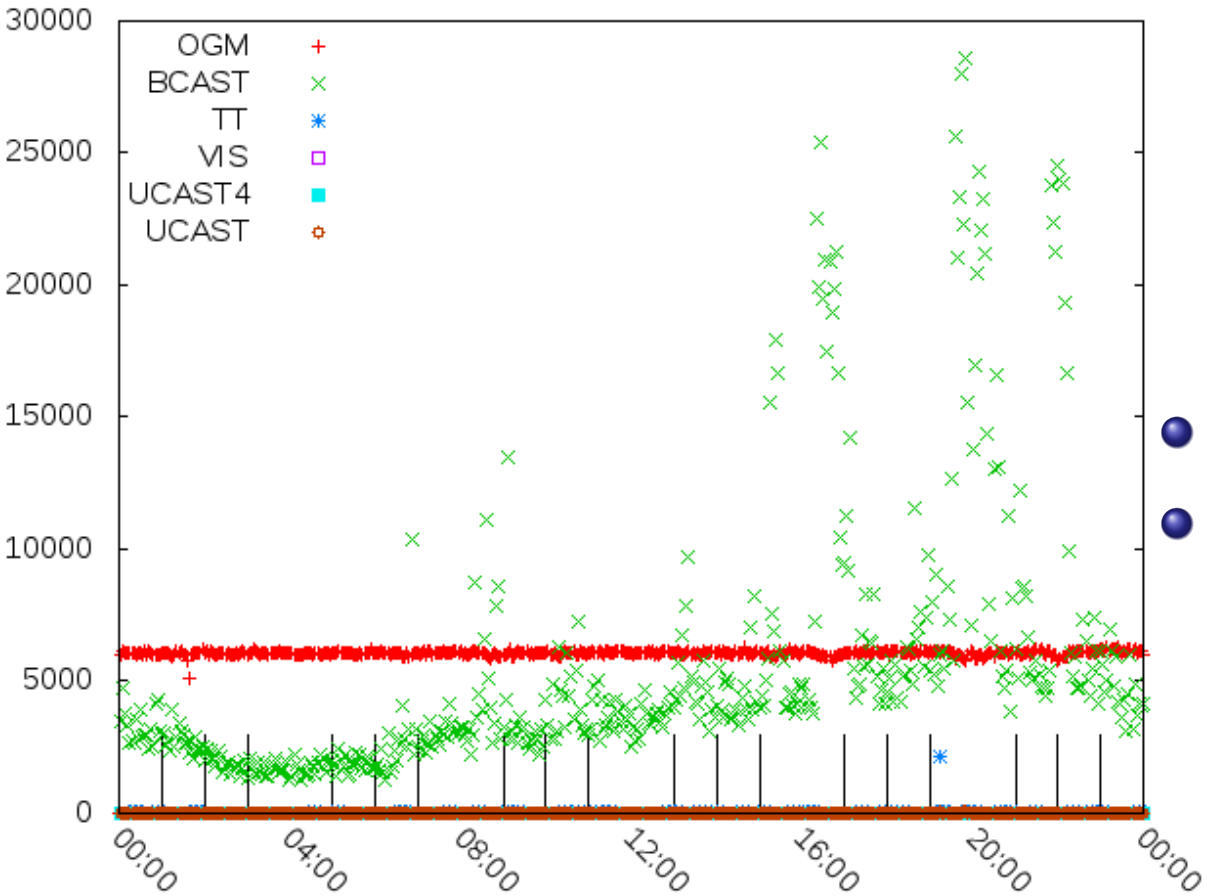
500+ nodes!

Outline

Sep. 2013: RX by batman-adv type, average Bits/s

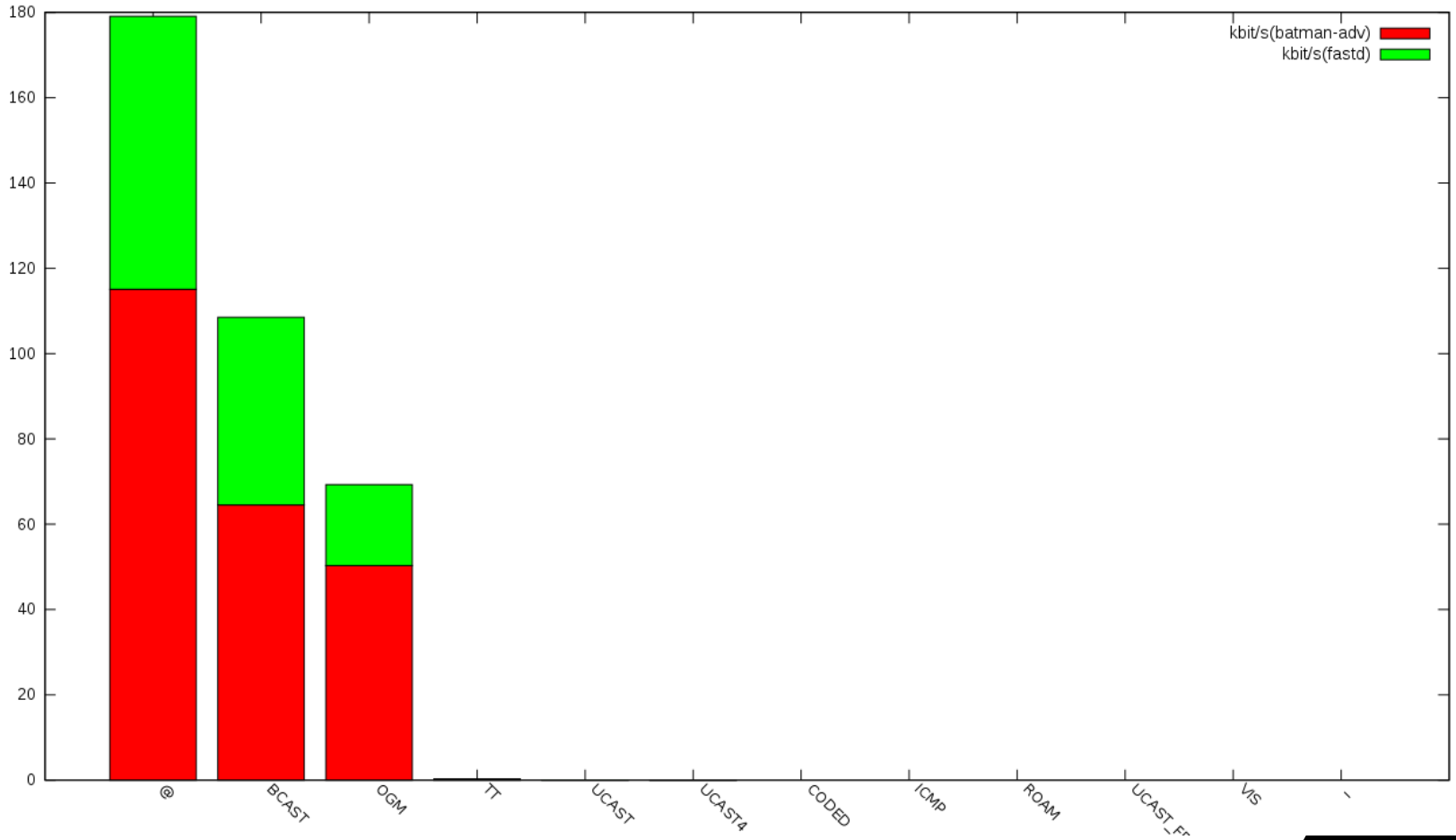


Sep. 2013: RX by batman-adv type, Packets/180s



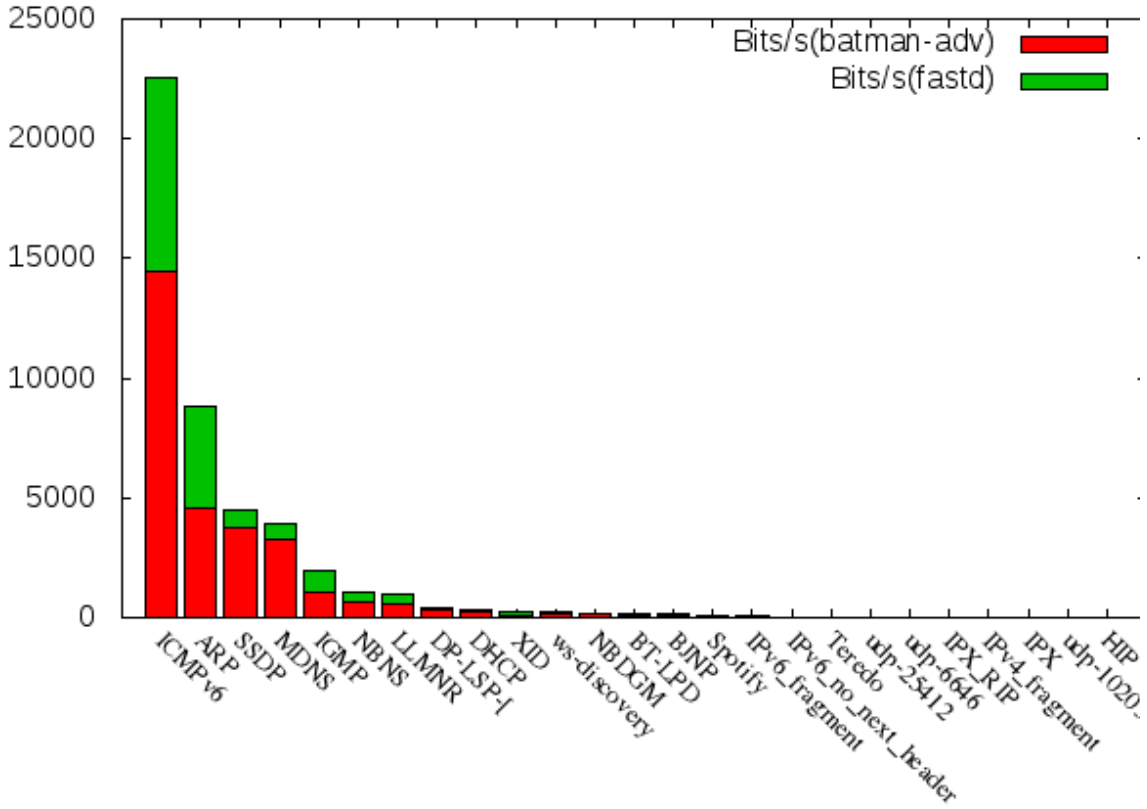
- OGM $\not\propto$ #clients
- BCAST $\propto$ #clients

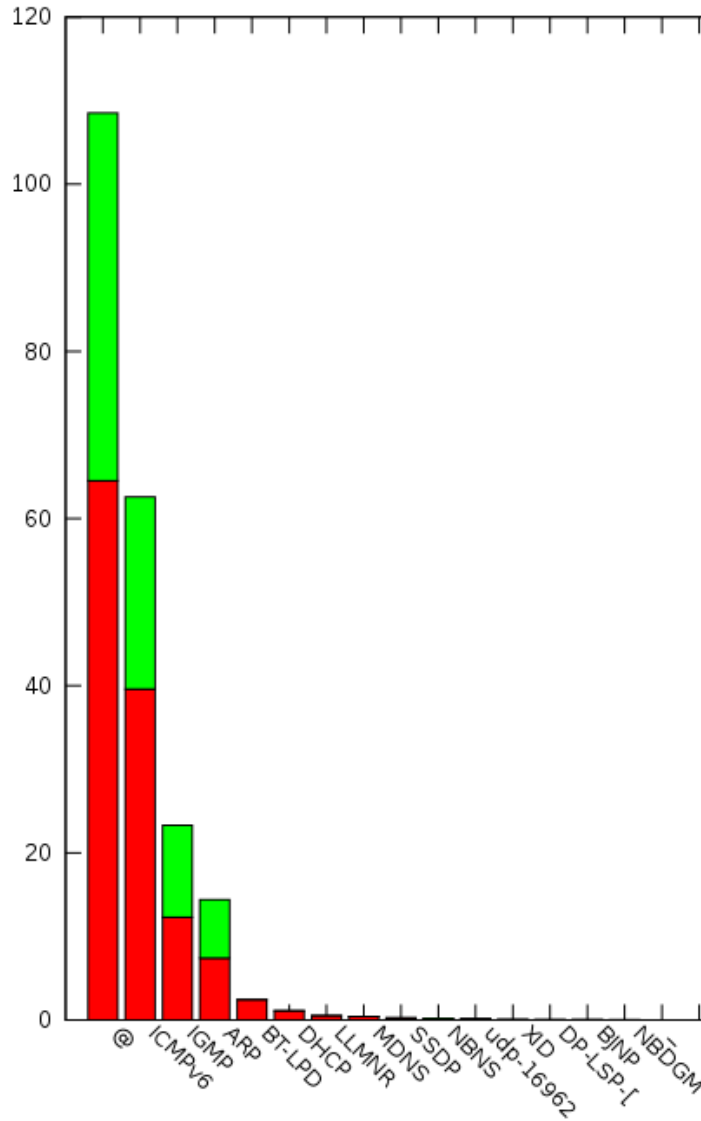
Aug. 2014: RX by batman-adv type, average Bits/s



RX by multicast type

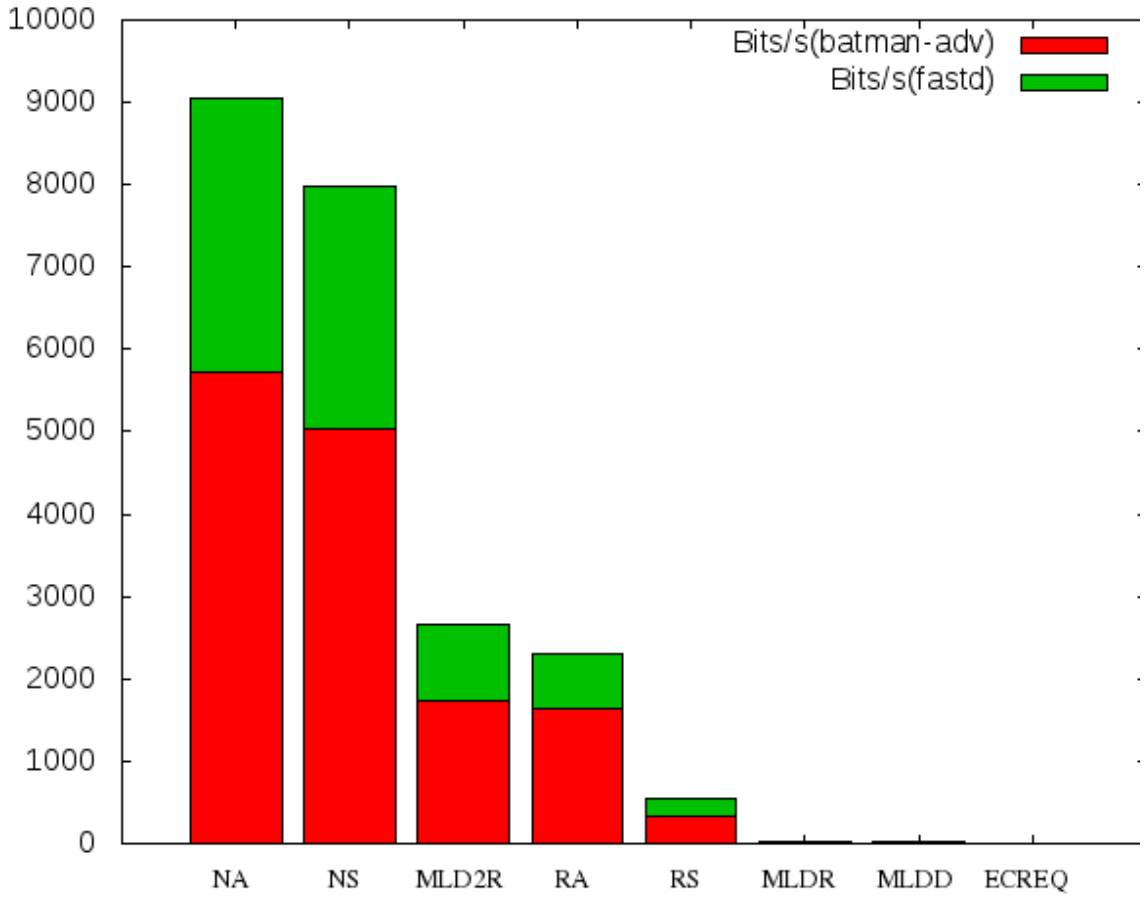
Sep. 2013, Bits/s | Aug. 2014, kbit/s →

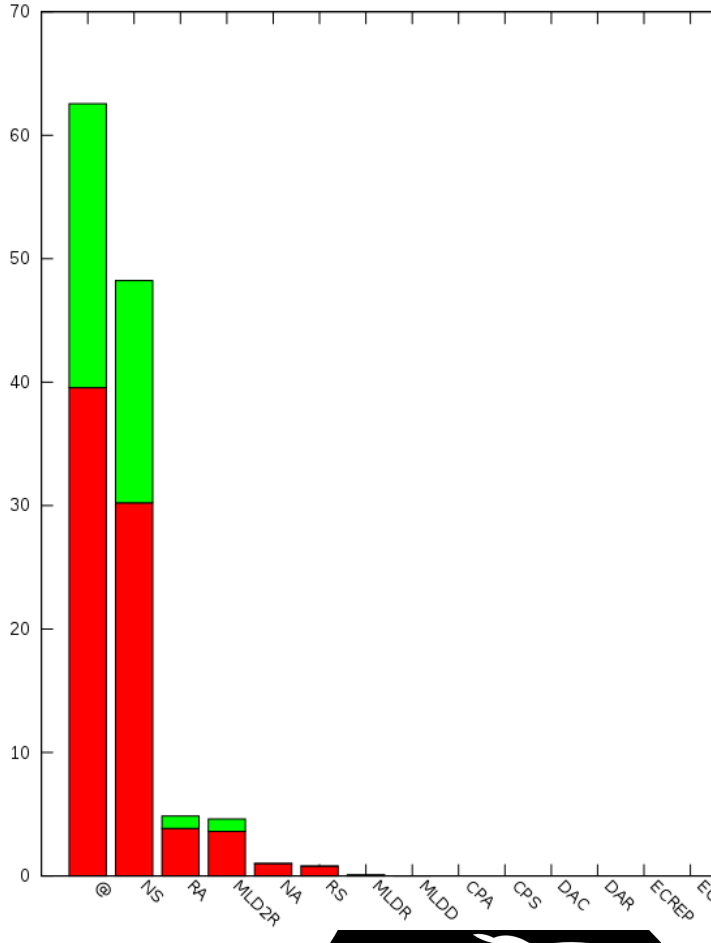




ICMPv6 by multicast type

Sep. 2013, Bits/s | Aug. 2014, kbit/s →





Live Measurements

- Using tshark (libwireshark)
- Stored in RRD
- Exported as rrd-xml and various images
- Current location (might move): https://metameute.de/~tux/Freifunk/stats/ffhh/

Outline

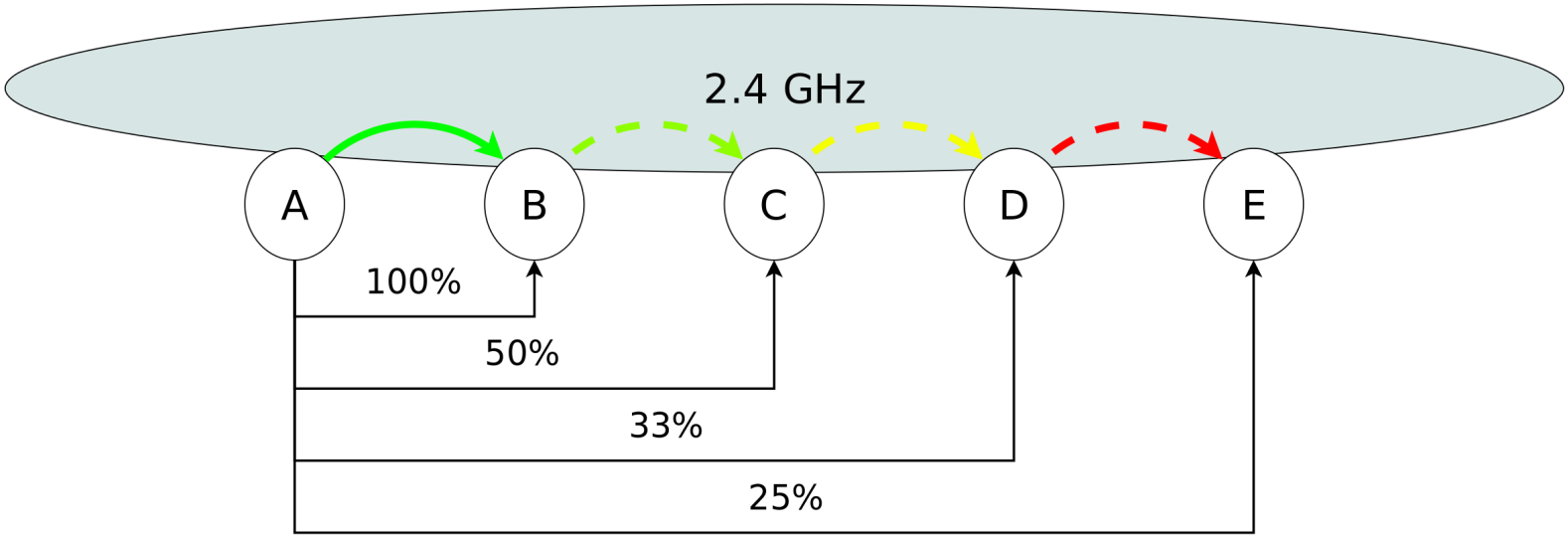
batman-adv 2014.0.0

- TVLV support
- Fragmentation v2
  - Any batman-adv packet type
  - Up to 16 fragments
  - $\Rightarrow$ 16x more clients per node!
- VLAN awareness
- (Compatibility break)

batman-adv 2014.1.0

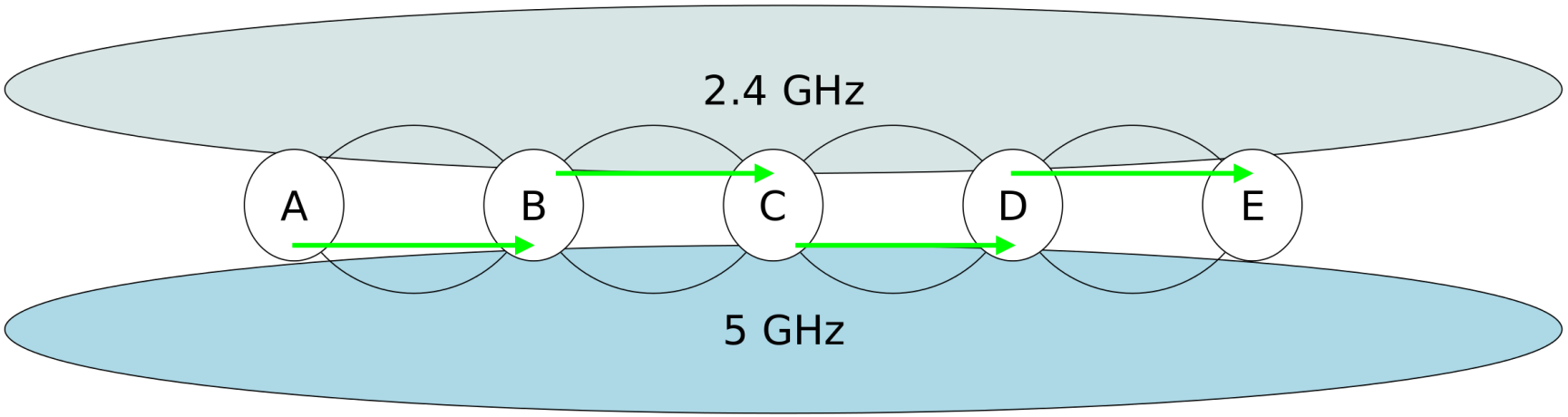
- Gateway/DHCP handling widened (for older / unusual DHCP clients)
- *Network wide* interface alternating

Interface alternating - The Issue



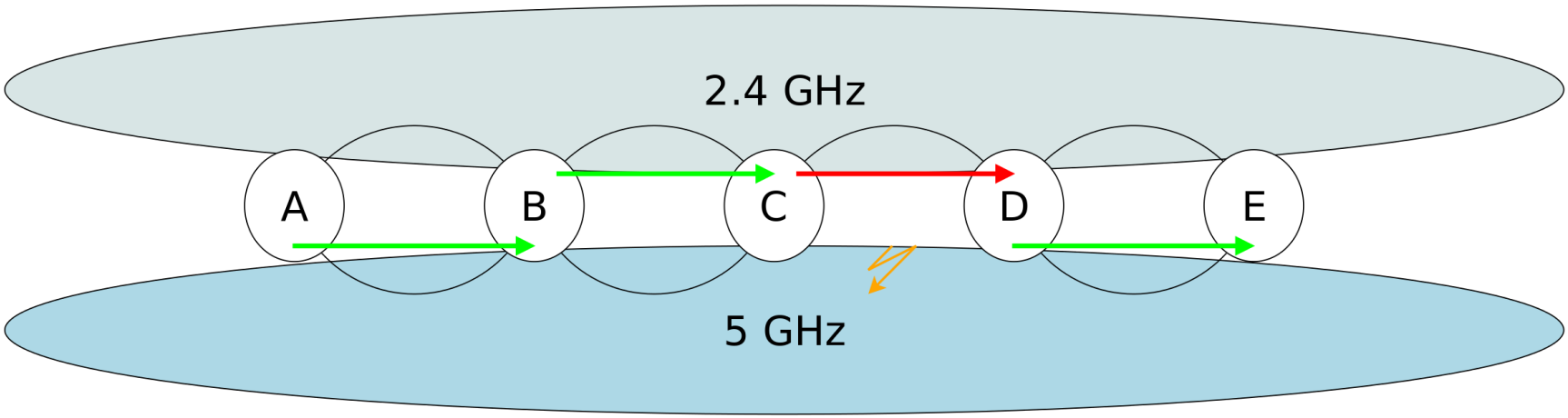
- Half-duplex nature of wifi
  $\Rightarrow$ Throughput decreases per hop (in range)

Interface alternating - What to do



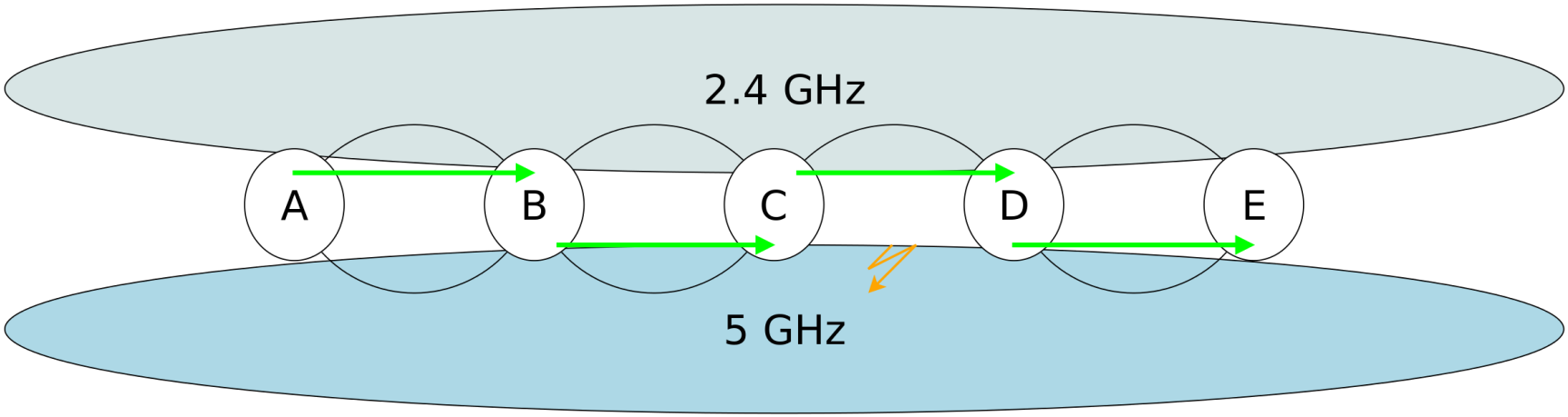
- $\Rightarrow$ Don't forward on incoming interface
- Nothing new yet :) (there since early 2010)

Interface alternating - Limitations



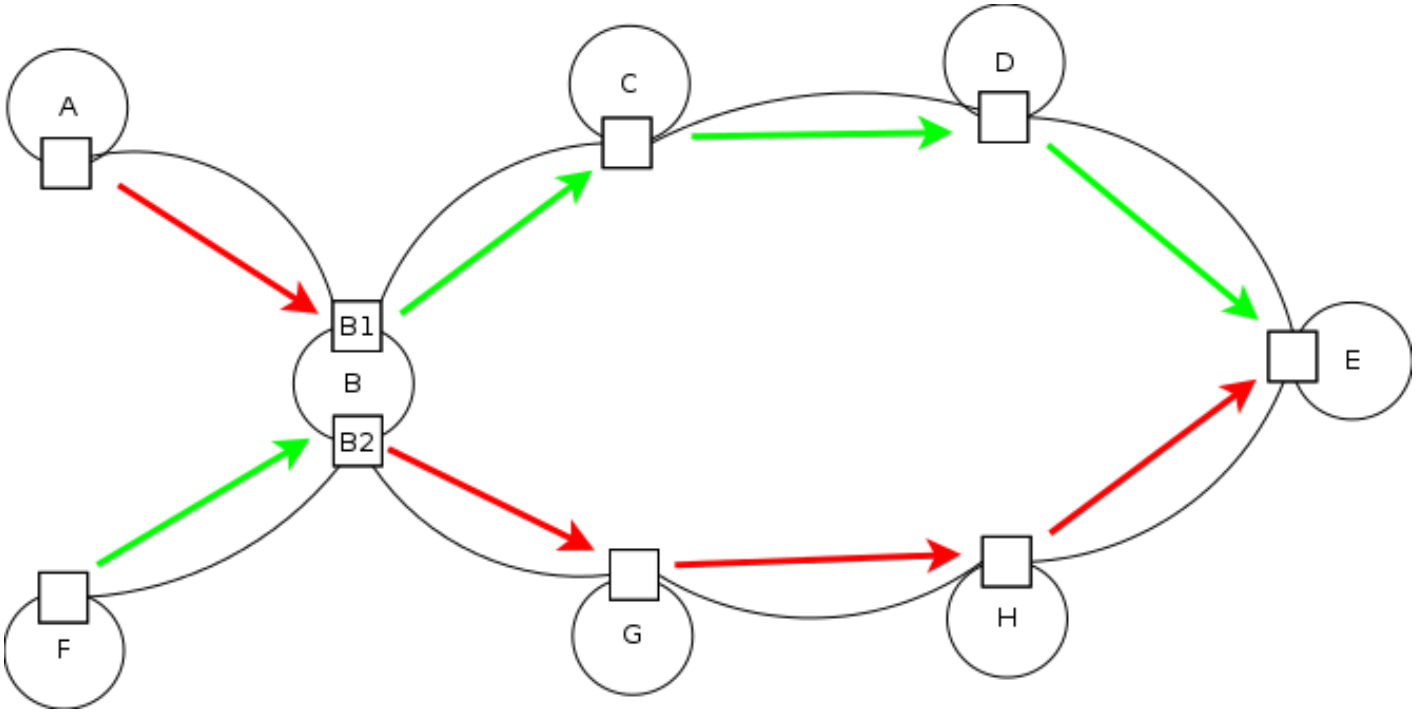
- Does not know where to start best : (

Interface alternating - Network wide!



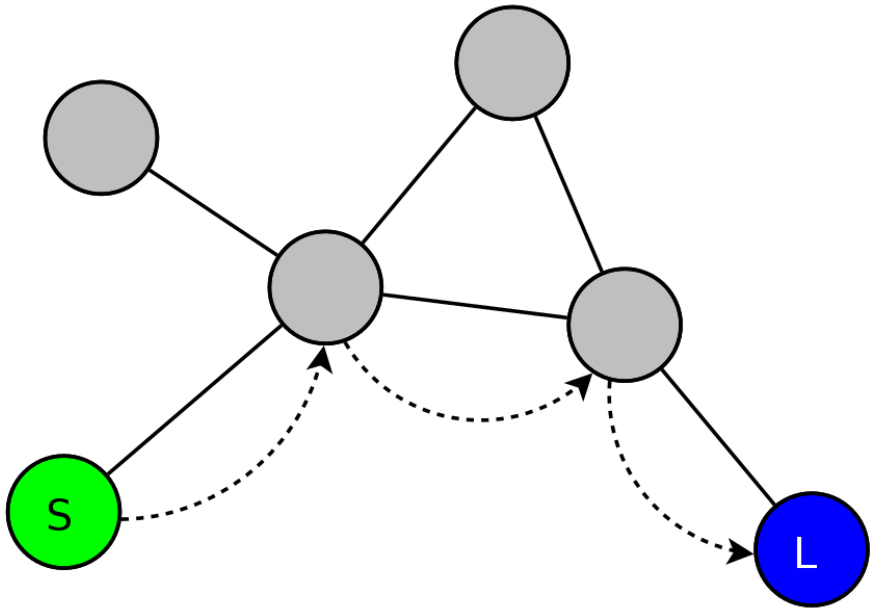
- Baked into path metric now :)

Network wide interface alternating - Path diversity



- Leight-weight *multipath* routing

batman-adv 2014.2.0



Sender

Non-listener

Listener

- Multicast group awareness
- Forwarding:
  - Zero receivers ⇒ frame dropped
  - Single receiver ⇒ forward via unicast
  - Multiple receivers ⇒ fallback to classic flooding
- (for setups without bridges)

Outline

Multicast awareness for bridged-setups

- Will eliminate ICMPv6 NS overhead
- Linux Bridge code patched+ready (Linux 3.17)
- batman-adv patches submitted and reviewed
- $\Rightarrow$ Probably part of v2014.4.0 / Linux 3.18

Multicast awareness for multiple receivers

- The fun part :)
- State: Some prototype patches
- Maybe end of the year

BATMAN V

- Update for the core routing protocol

BATMAN V - Throughput Metric

- BATMAN IV: Modified ETX (packetloss) metric
- BATMAN V: Best path by throughput
- Wifi $\Rightarrow$ Query Rate Control

BATMAN V - ELP

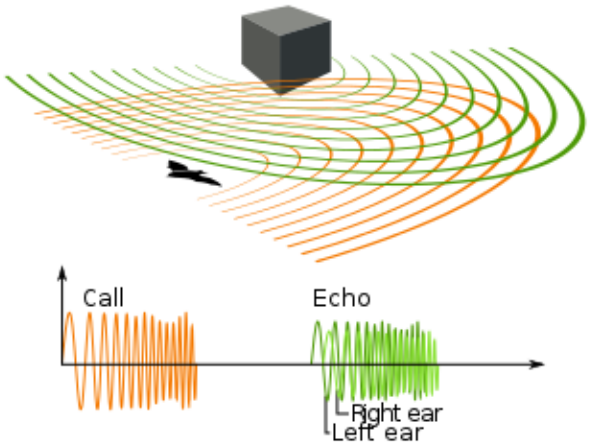


Image Source: Petteri Aimonen, Wikimedia Commons, CC-BY-SA

- Splitting OGMs: ELP + OGMv2
- ELP: Neighbor discovery + link quality
- OGMv2: Path quality
- Advantage: Slower OGMv2 interval possible
- $\Rightarrow$ Less overhead

BATMAN V - ELP

Status:

- Linux cfg/mac80211 code patched+ready
- Multi routing protocol architecture in batman-adv ready
- ELP+OGMv2 patches in Antonio's branch (ordex/batman_v)

Conclusion

- batman-adv runs fine with >500 nodes in our Gluon-architecture
- Still scales some more
  (but need to keep an eye on OGM traffic)
- Reduced overhead on the roadmap
- More multicast fun to come
- Let's get the advanced Gluon autoupdater running :)