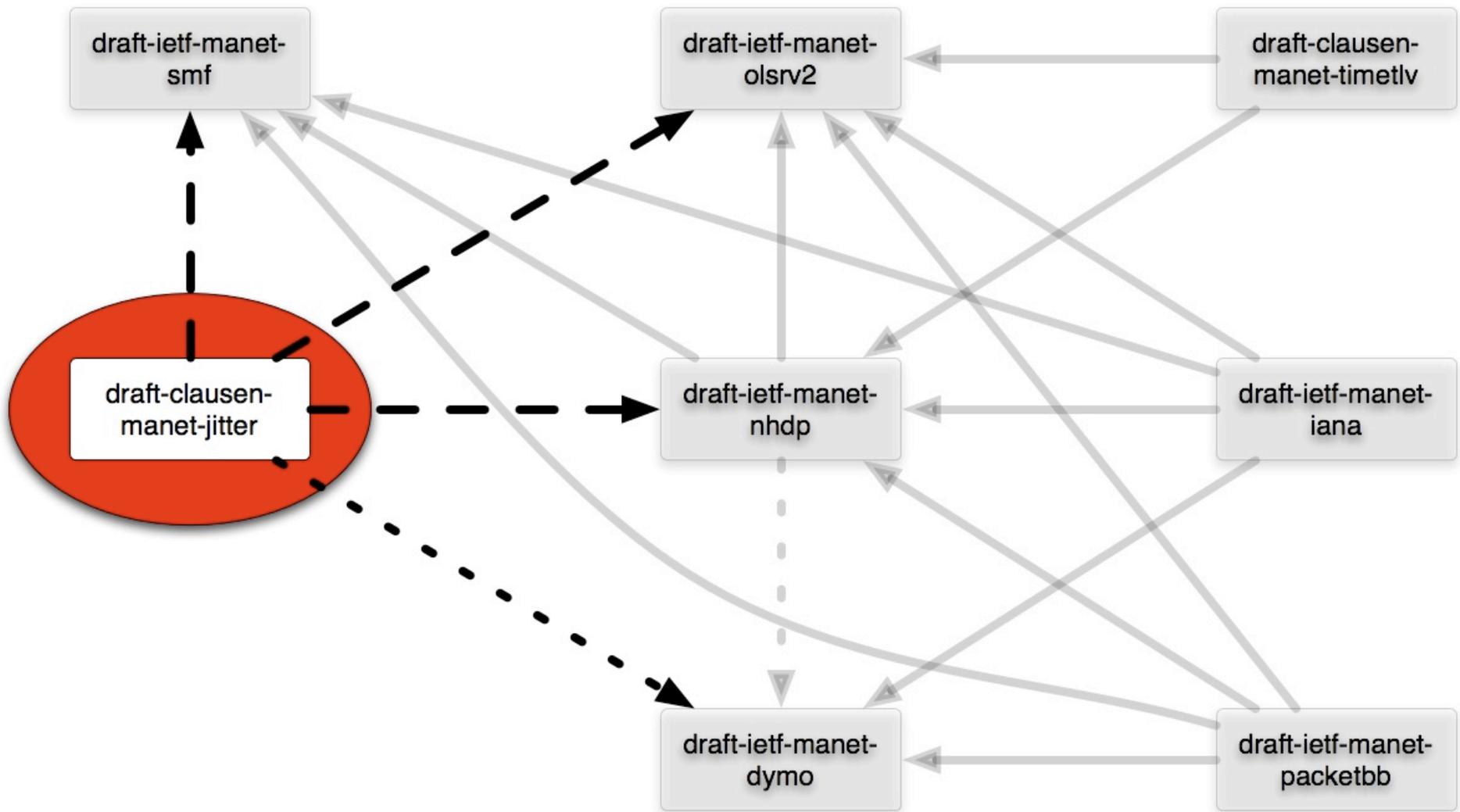


# Jitter considerations in MANETs

draft-clausen-manet-jitter-01

Justin W. Dean

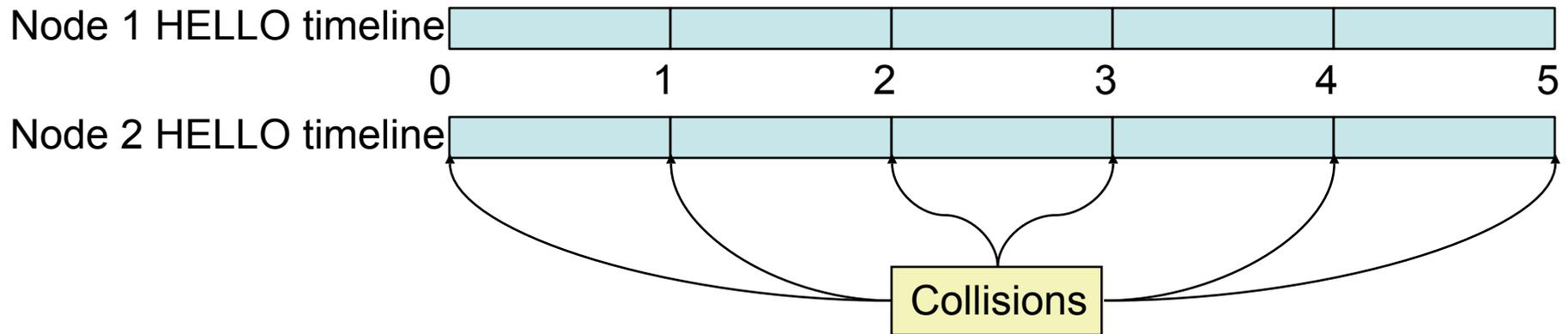
<jdean@itd.nrl.navy.mil>



# Jitter

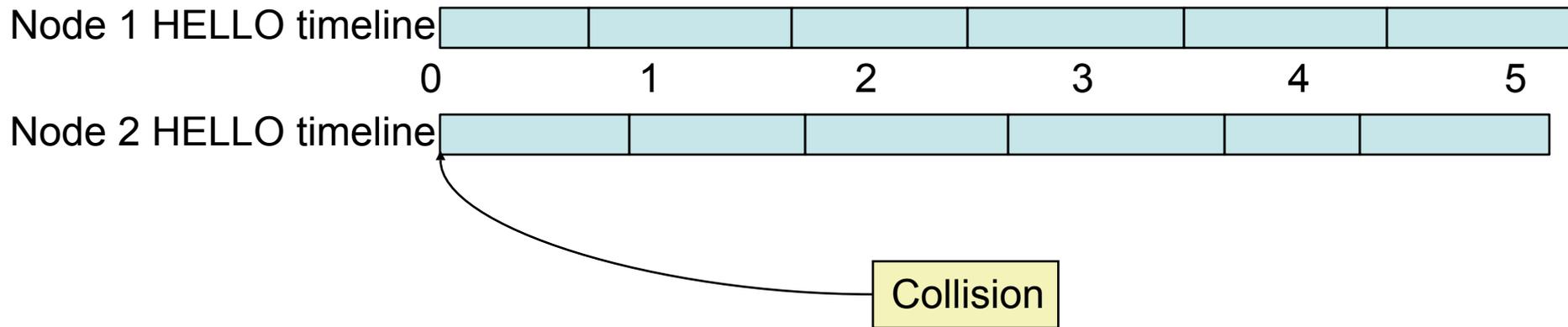
- Timer based Jitter
  - Desynchronizes timers
  - Over time evenly distributes traffic load
  - Guarantees transmission within timer interval
  - Shortens effective interval rate
- Triggered Event and Forwarding based Jitter
  - Alleviates packet collisions of transmitted packets
    - Synchronized unicast transmissions
    - Flooded multicast packets
  - Adds delay to each transmission

# Synchronized HELLO Issue without Jitter



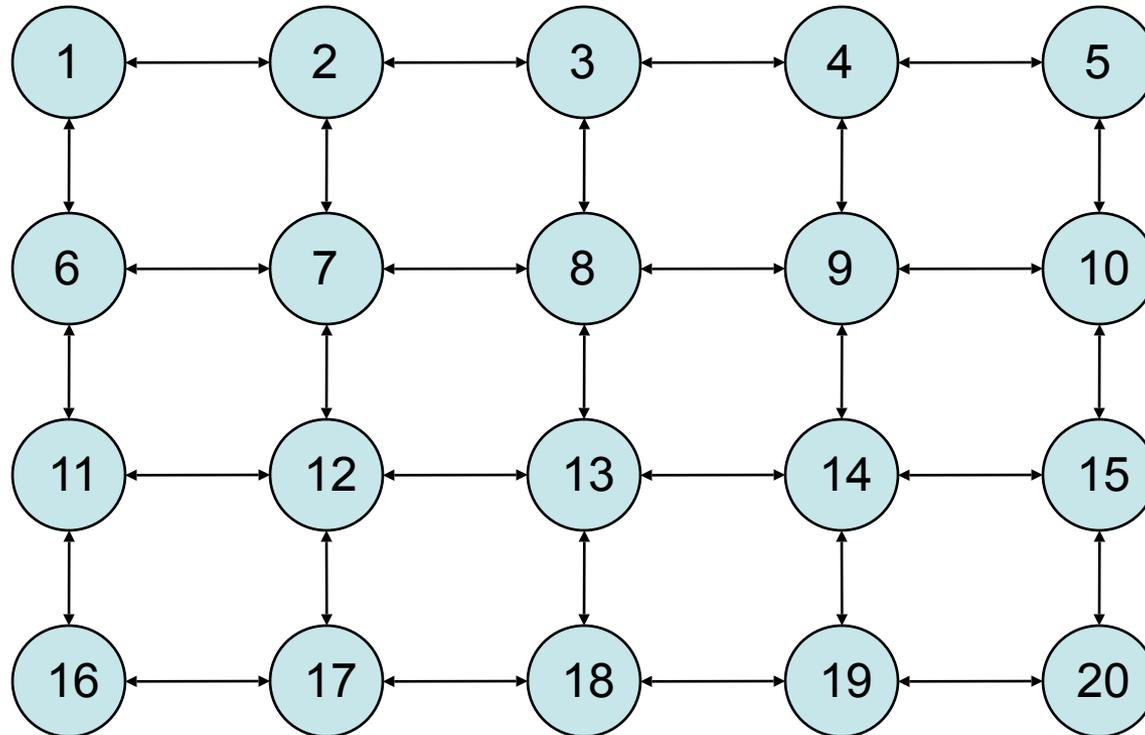
- The first HELLO message collides.
- Each HELLO message thereafter is sent at the same time.
- Without jitter nodes may become synchronized resulting in colliding packets.

# Jitter Introduced



- Hello messages start out at the same time.
- Jitter alleviates synchronization and subsequent collisions are avoided.
- Note: The effective HELLO interval is shortened using this jitter method.

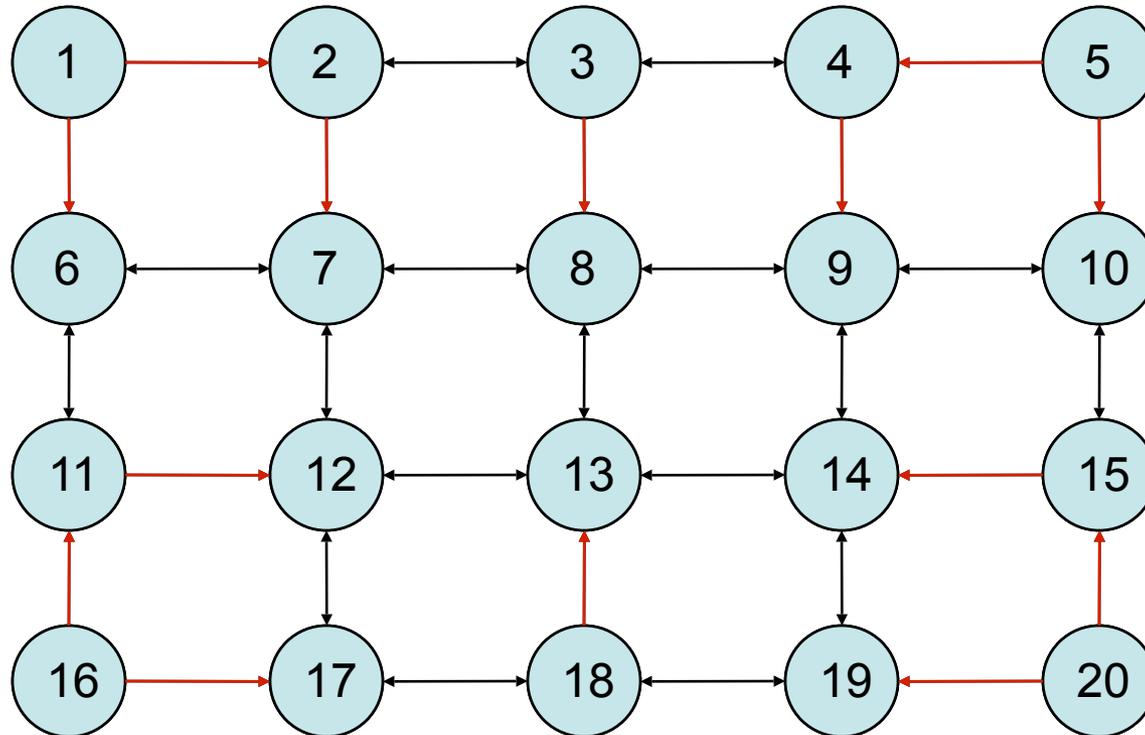
# Forwarding without Jitter Issue Simulated Example Network



Neighborhood network view described in the simulation includes all possible one hop connections correctly.

# Forwarding Path Using MPRs

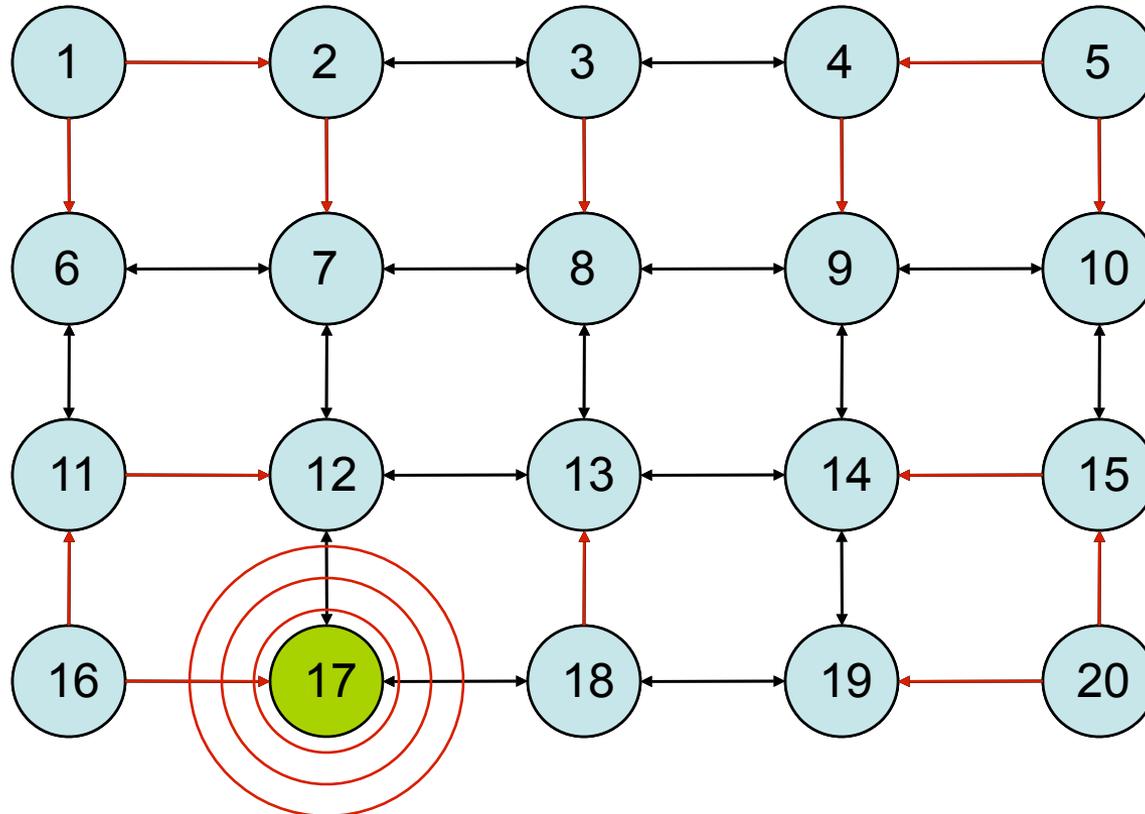
Time 22.416220 (step 0)



Arrows indicate multipoint relays. A topology control message (TC) sent along an arrow path will be forwarded if that TC was the first received. Red arrows are just highlighting the directional flooding. The forwarding path (MPR nodes) is correct for this network.

# Packet (TC) to be Flooded Sourced

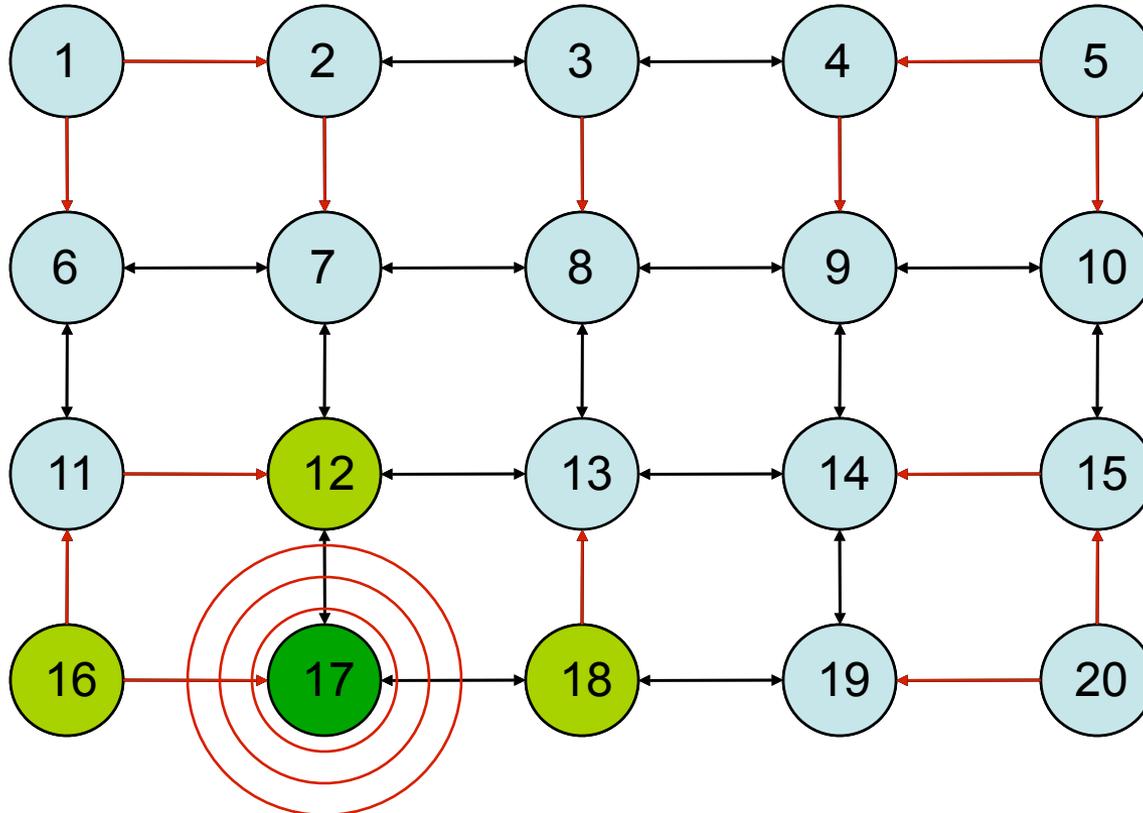
Time just after 22.416220 (step 1)



In this case the packet is a TC message but this can be any packet which is to be flooded.

# Receiving the Sourced Packet

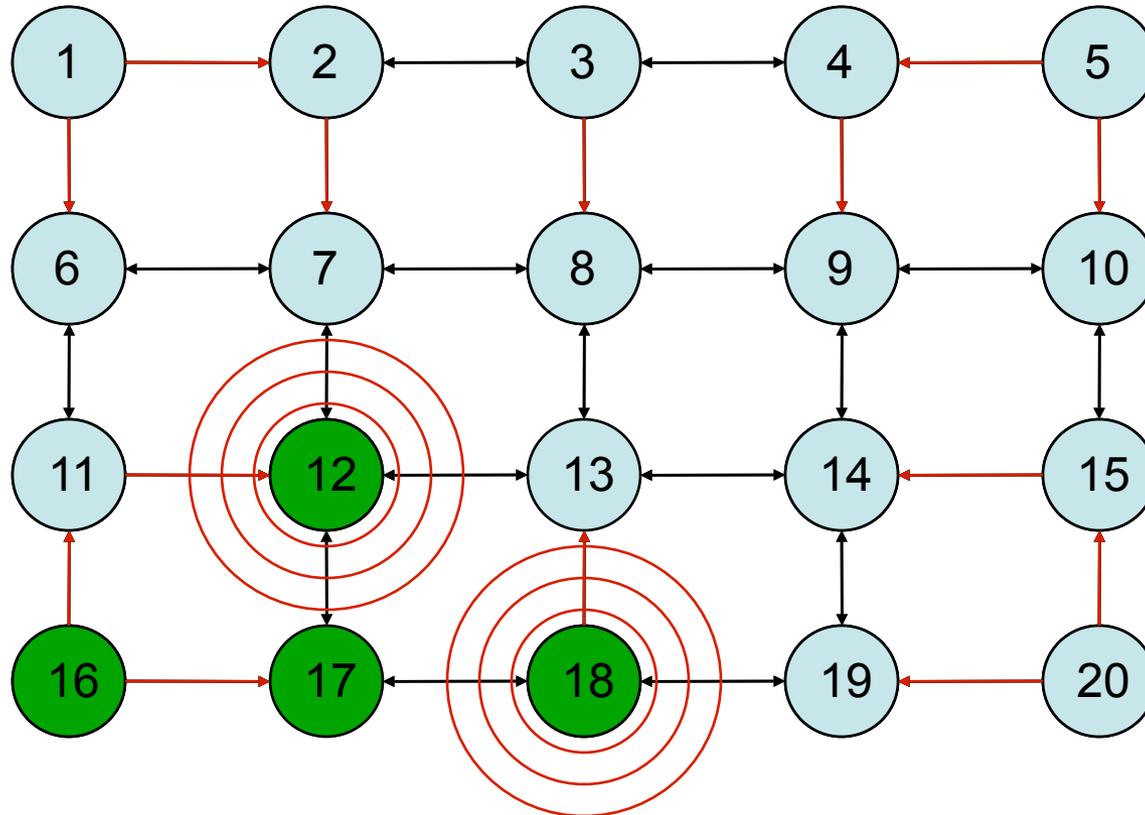
Time 22.417932 (step 1.1)



Nodes 12, 16 and 18 receive TC message.

# Forwarding Packet

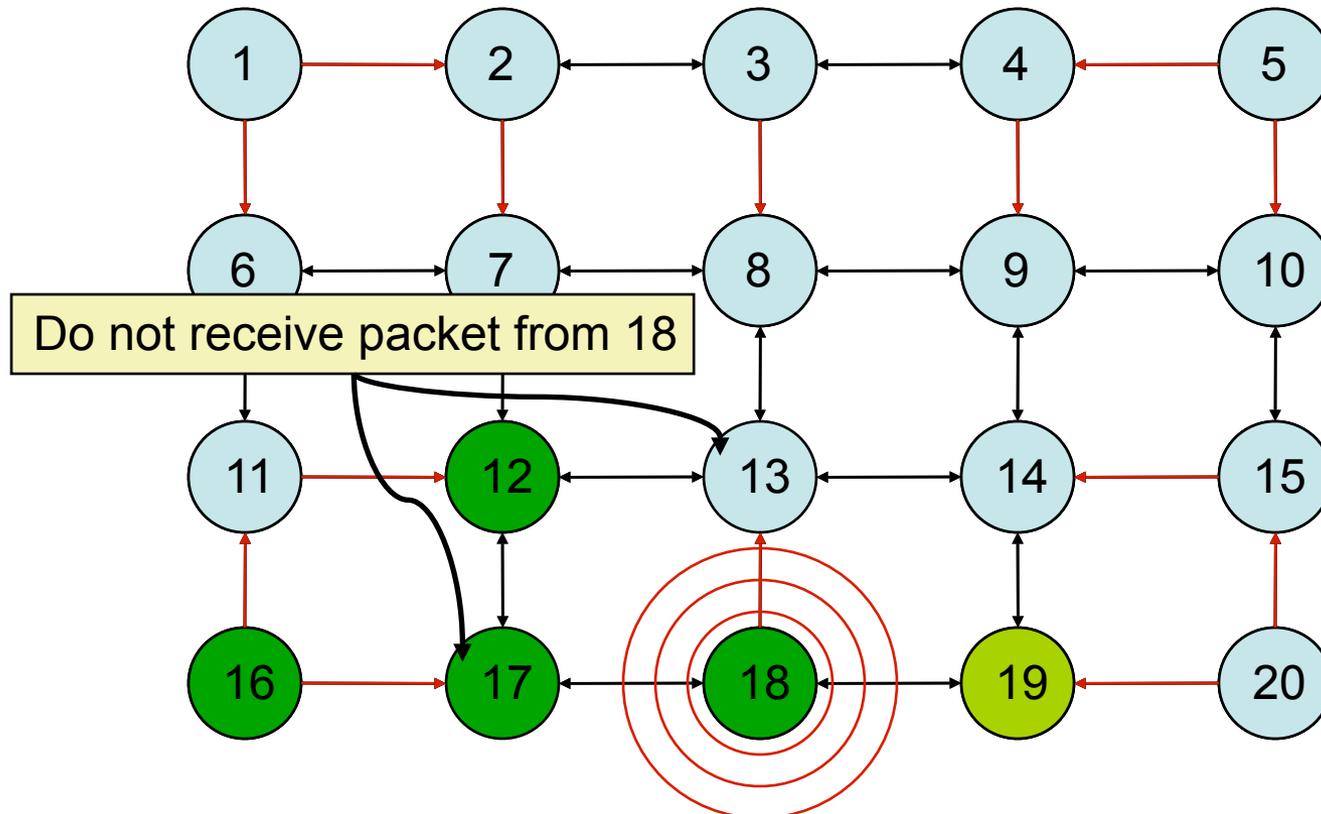
Time just after 22.417932 (step 2)



Nodes 12, and 18 resend TC message.  
Notice that 16 does not because the TC message did not arrive on an arrowed path; this is correct.

# Packet Collision

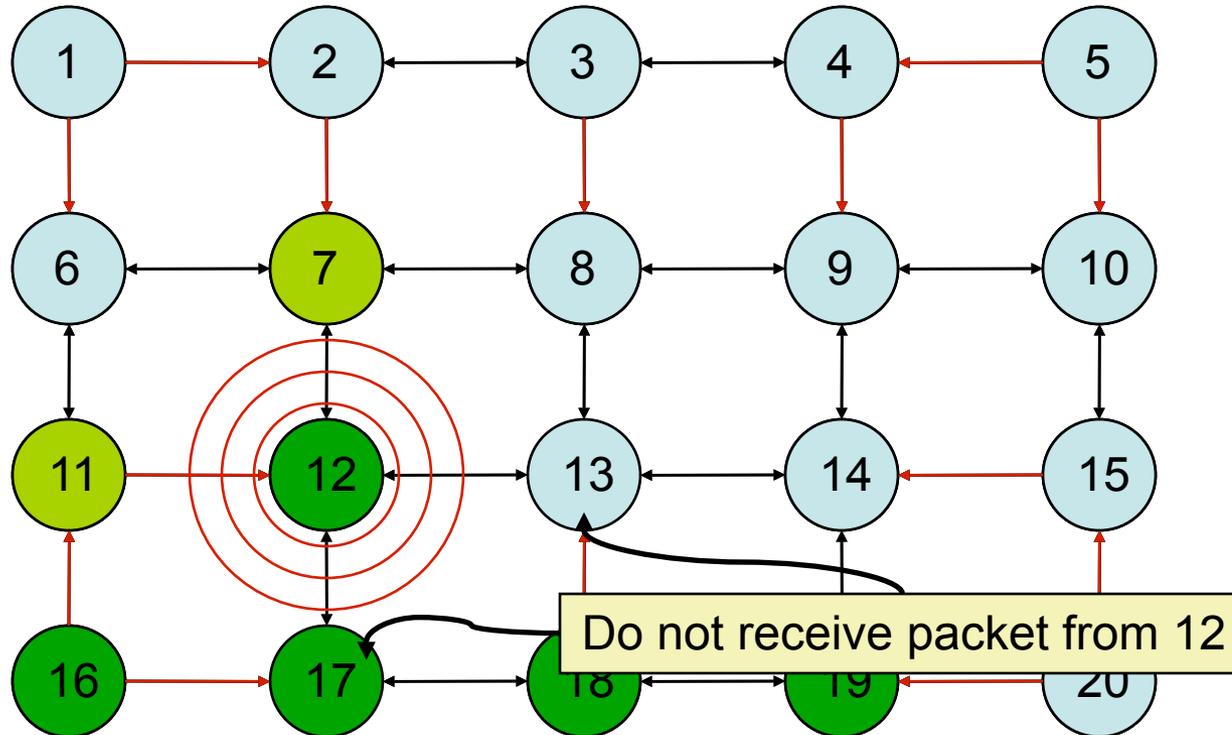
Time 22.419592 (step 2.1)



Only node 19 hears TC from 18. Node 13 and 17 do not and should. Node 12 is also forwarding at about this time causing packet collision.

# Packet Collision

Time 22.419642 (step 2.2)



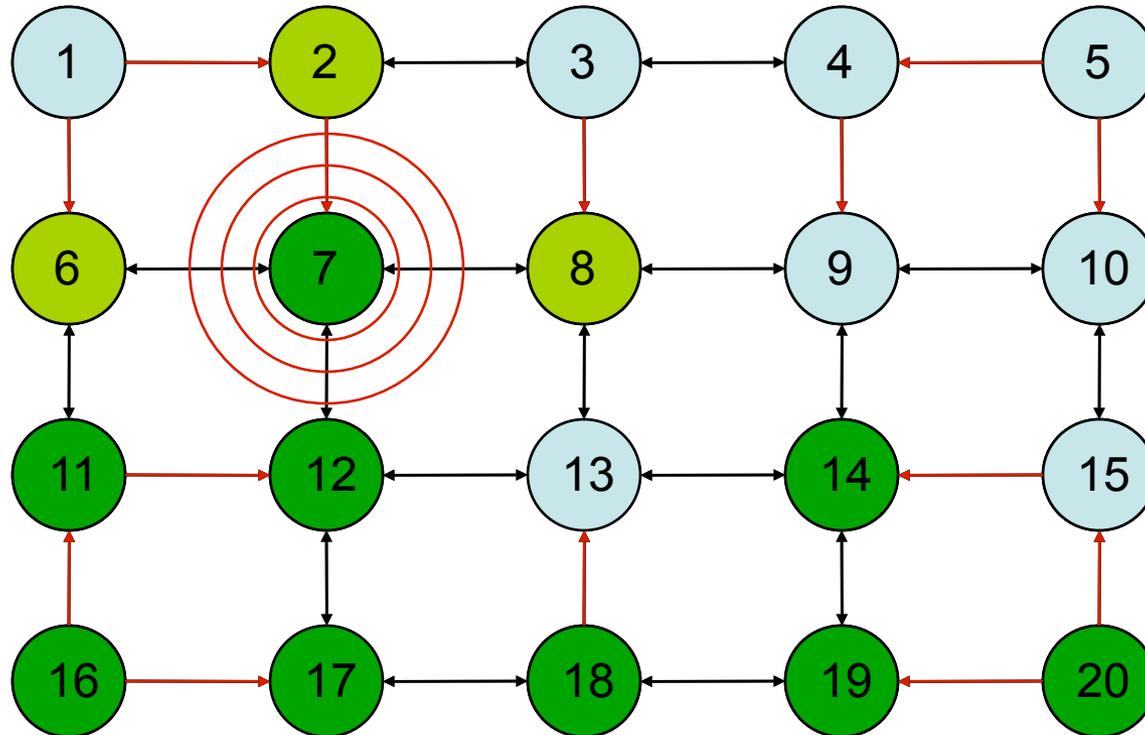
Only node 11 and 7 hear TC from 12. Node 13 and 17 do not and should.





# Receiving Forwarded Packet

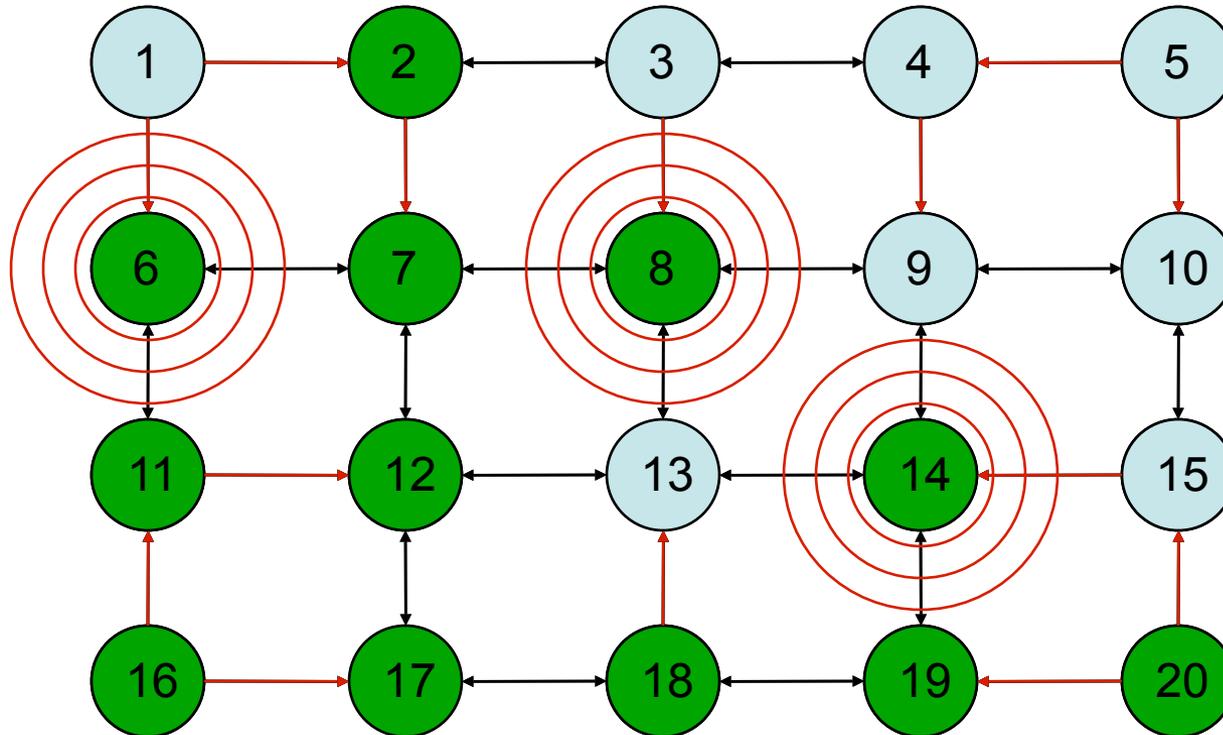
Time 22.421343 (step 3.2)



Nodes 2, 6, 8 and 12 receive TC message.

# Retransmission of Packet

Time just after 22.421343 (step 4)

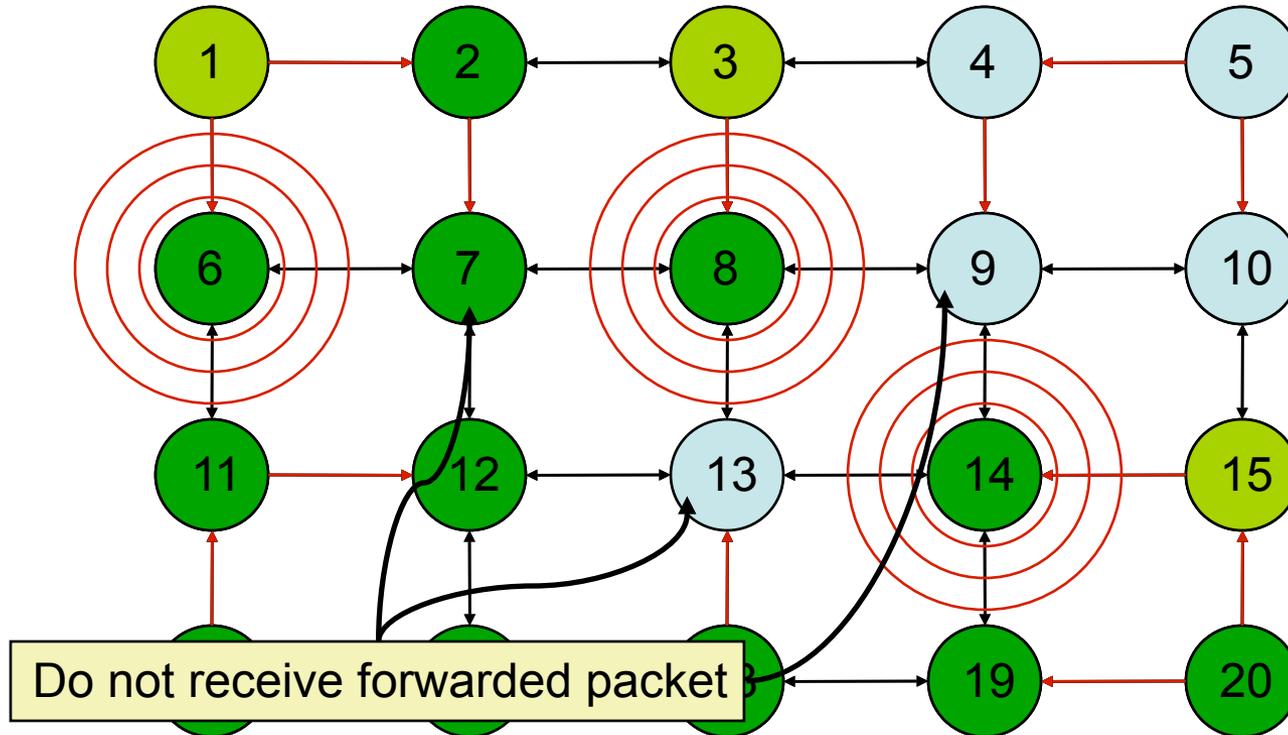


Nodes 6, 8 and 14 resend TC message.

Note that 2 and 20 don't forward because the TC did not arrive from an MPR selector.

# Packet Collisions

Time 22.422977 (step 4.1)



Nodes 15 and 19 receive TC message from 14.

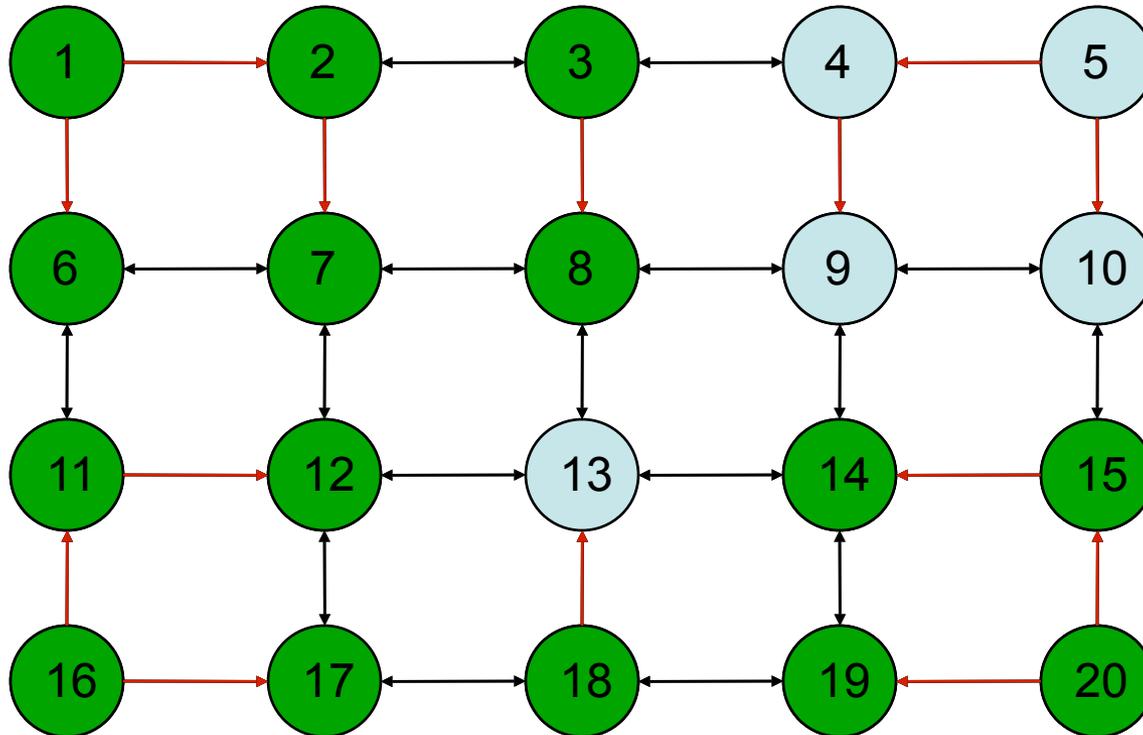
Node 3 receives the TC message from 8.

Nodes 1 and 11 receive TC message from 6.

Nodes 7, 9, and 13 do not receive any TC messages at this time.

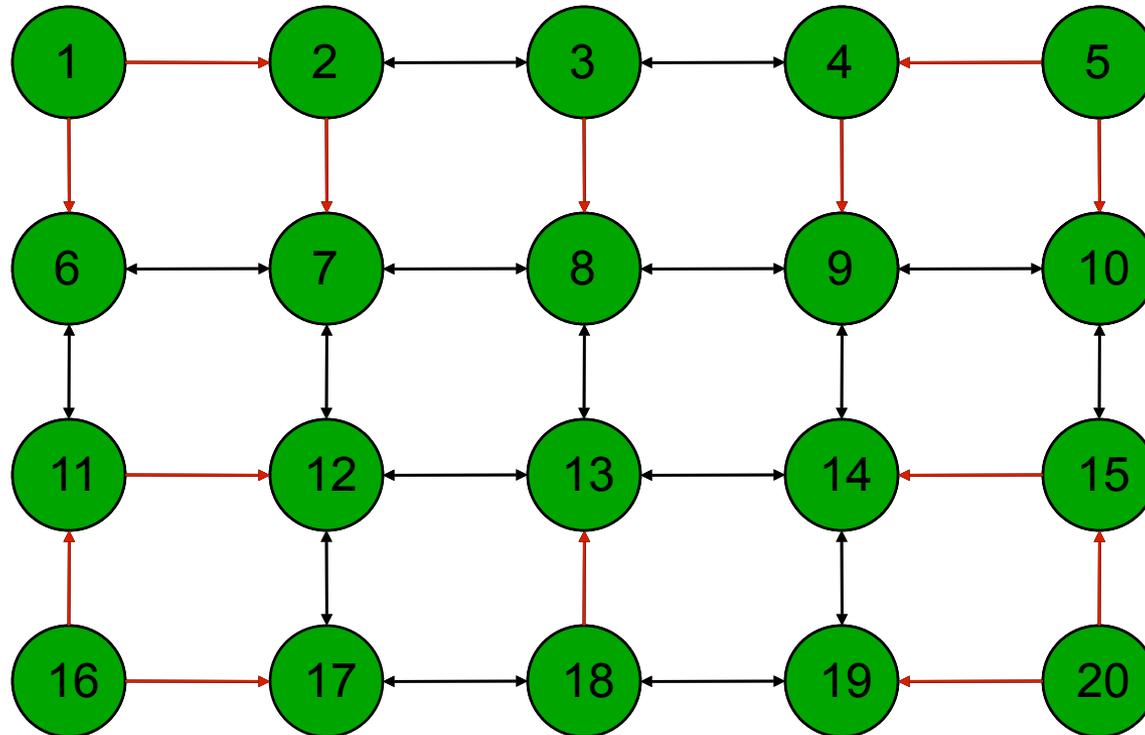
# Flooding Stops with Incomplete Coverage

Time after 22.423028 (step 5)



Flooding stops as nodes 1, 3 and 15 are not part of the forwarding path. Nodes 4, 5, 9, 10 and 13 do not receive the flooded packet.

# Forwarding Jitter Introduced



- Forwarded packets are delayed a small amount resulting in fewer collisions between retransmissions.
- Full network wide coverage can be achieved.

# Document Status?

- Intended status: informational
  - Common considerations for jitter
  - when suggested by MAC
- Move to WG document?
  - potentially applicable to all (MANET) protocols
- Towards last call?