

OAM-AH

OAM Ad-Hoc goals

- Agree on OAM tools to be standardized in 802.17
- Propose text improvements to current draft

Draft Status

- Draft based on Darwin
 - Approved in January 2002 Interim and ratified in March 2002 Plenarum
- Includes the following tools:
 - Echo: Required
 - CC and RDI: Optional
 - Activate/Deactivate: Optional (With editors note: FFS)
- Defects:
 - LOC
 - RDI

Comment based technical changes

- Echo options reduced to 3:
 - Respond through default
 - Respond through Ringlet 0
 - Respond through Ringlet 1
- Echo response time not specified
 - Which parameters influence it are listed

Opinions Summary

- Echo
 - Majority see it as relevant to the standard:
 - Define Echo frame format
 - Define MAC action upon receiving a Echo frame
 - May be used as a CC by client
- CC and RDI
 - Serves as a tool to discover MAC related failures
 - Not a MAC function. If important client can implement
 - Other mechanisms may be upgraded to discover the same defects (e.g. topology discovery)
- Activation/Deactivation
 - Needs further study

CC rationale

Leon Bruckman

CC fault monitoring

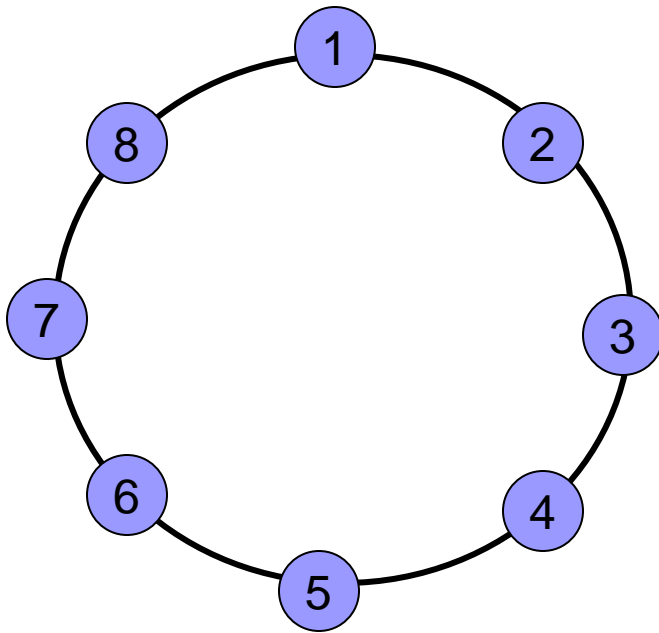
- Hard failures only
 - Will not catch intermittent failures
- MAC packets stealing:
 - MAC hardware is stripping wrong packets because of DA or TTL logic failure
- Misconfigurations
 - The Station address is duplicated
 - Topology discovery will indicate a problem, but CC will immediately indicate the affected Station

CC fault monitoring

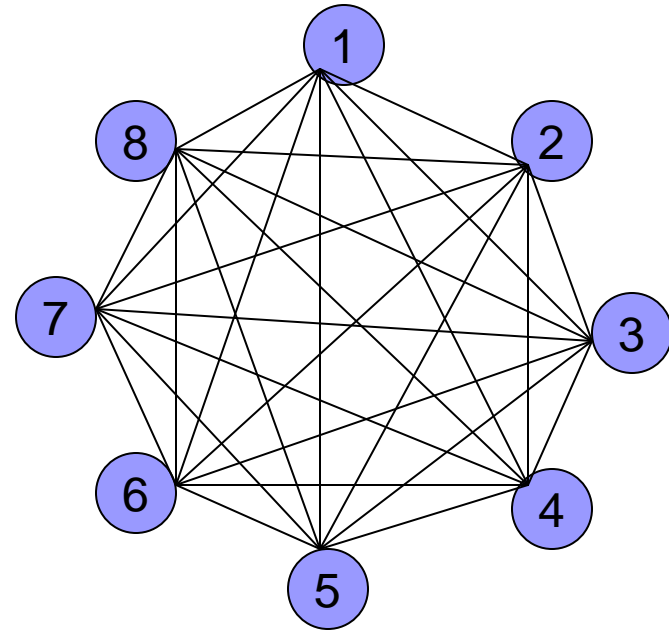
- Transit path failures
 - Station not passing frames
 - We may need two CCs: one for the PTQ and one for the STQ
 - For full protection CC must be used in both ringlets
- Summary:
 - CC will catch all hard failures on the MAC level

Network views

- Physical layout



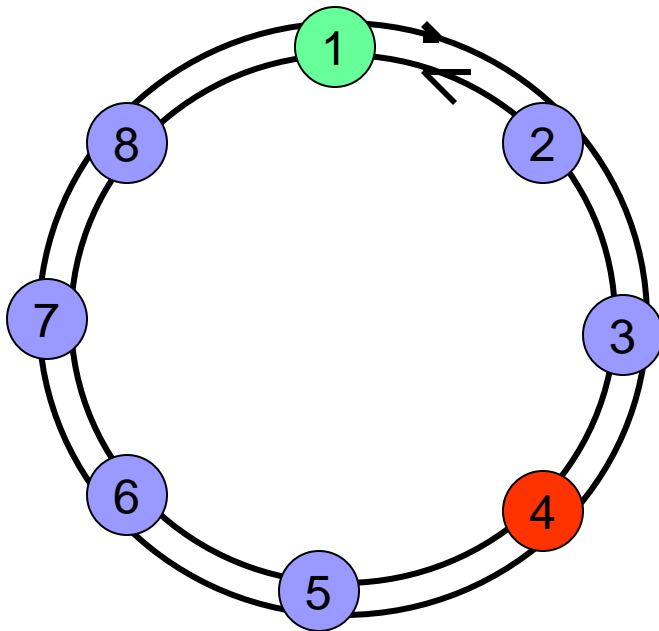
- Connectivity layout



Tools

- Physical layer and fairness (used as keep alive) verify only adjacent nodes reachability (physical layout)
- Topology discovery may detect inconsistencies, but decisions can be taken only at ring level
- CC acts as a keep alive between any pair of stations
 - Verifies the whole transit path without relying on client frames

MAC Failure example

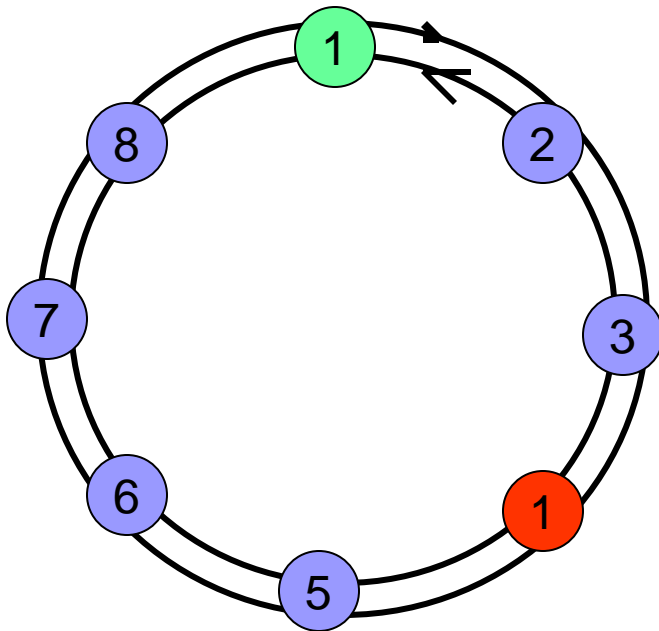


- Station 4 MAC failure steals packets with DA=1
- Station 1 declares LOC in Ringlet 0 for 5, 6, 7 and 8 and in Ringlet 1 for 2 and 3
- Stations receive RDI

MAC Failure example

- Physical layer tools, and fairness keep alive between adjacent stations will not detect this failure
- Topology discovery based on hello messages between adjacent stations and broadcast messages will not detect this failure
 - Note that Station 4 SA=4 since the failure is at the MAC receive side

MAC Misconfiguration example



- Station 4 misconfigured to 1
- Station 1 declares LOC in Ringlet 0 for 5, 6, 7 and 8 and in Ringlet 1 for 2 and 3
- Stations receive RDI
 - Should be sent in both ringlets

MAC Misconfiguration example

- Physical layer tools, and fairness keep alive between adjacent stations will not detect this failure
- Topology discovery based on hello messages between adjacent stations and broadcast messages will detect a duplication
 - Hard to find out which services are affected

CC in the MAC or in the client ?

- *In the MAC because:*
- MAC layer should be independent
 - Enough OAM tools must be in place to provide for fast fault localization without relying on other layers
- CC must be defined by the 802.17 standard to enable interoperability
 - Client is not standardized, deferring CC to the client will not allow interoperability

What next on CC/RDI ?

- There are 3 options to be considered:
 - Define CC/RDI in the standard
 - Normative
 - Optional
 - Add informative annex describing the use of Echo for “CC/RDI like” fault detection
 - Remove CC/RDI from 802.17