

A Mac Control solution for OAM

Sponsors: D. Gentry, Dominet Systems
S. Muller, Sun Microsystems

Three distinct needs

- Operations (statistics, configuration)
 - Needed to spot problems and verify SLAs
 - Should not disturb user traffic
- Administration
 - Other operator requirements
- Maintenance (troubleshooting)
 - Active debugging of a problem
 - Frequently involves human interaction
 - Online versus Intrusive troubleshooting

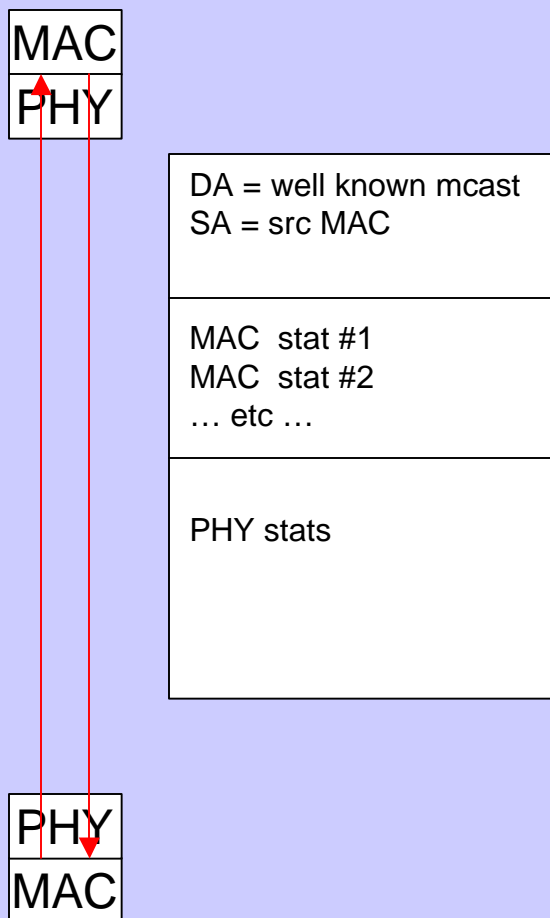
Operations

- New stats for new stuff
 - New PHYs, for example
- Far End statistics
- History for all of the above

Operations: Recordkeeping

- Obvious need: stats for new widgets
 - FEC corrected error counters
 - Slot assignments for PON nodes
 - Etc.
- Just define the counters
 - Rely on SNMP/CMIP/etc to query

Operations: Far end stats



- Information from the far end is very valuable
- One possibility: Mac Control
- Gather stats at intervals
 - BW consumption bounded
 - Could be polled or proactive
 - Immediate trap if urgent
- Some stats are PHY specific

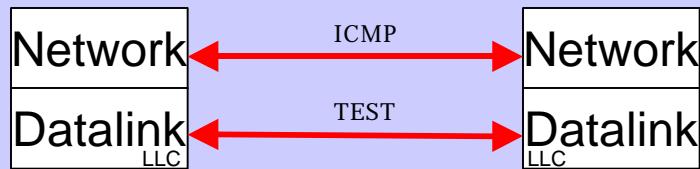
Operations: Historical Stats

- RMON History table (for EtherMIB)
 - Snapshot statistics at intervals
 - Only consume net bandwidth / management cycles when needed
 - Maintained by the local agent
 - Oldest stats fall off the bottom
- History for other stuff very useful
 - New PHY stats, recent EtherMIB stats too.
 - Encourage/liason with IETF for new MIB

Administration

- Other vendor or carrier requirements
 - Could be anything
 - Out of scope of standard
 - Use packets
- Resource use should be bounded
 - Systems vendors may provide traffic controls
 - Traffic shaping is beyond scope of standard

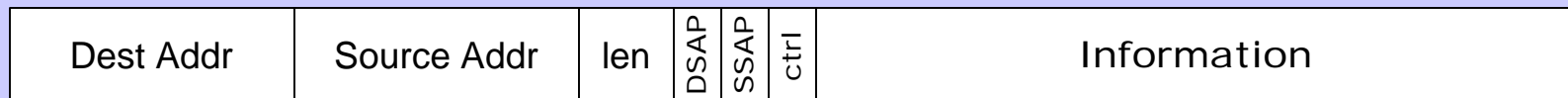
Maintenance: Online troubleshooting



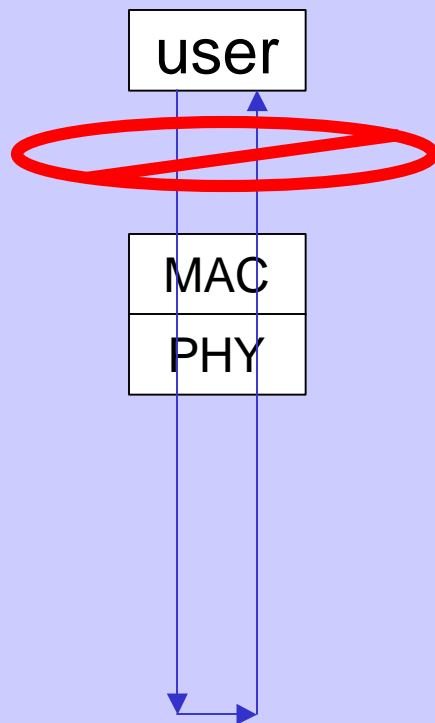
- Basic diagnostics while the link operates
- Frequently called “ping”
 - L3: ICMP ECHO, NBP ECHO, et al
 - L2: TEST frames
- TEST support (802.2 Type 1) not always implemented

Maintenance: 802.2 TEST

- TEST is defined in 802.2 (Type I)
- 3 byte header: DSAP, SSAP, Control
- Information field up to max LLC size
 - remote end will return it

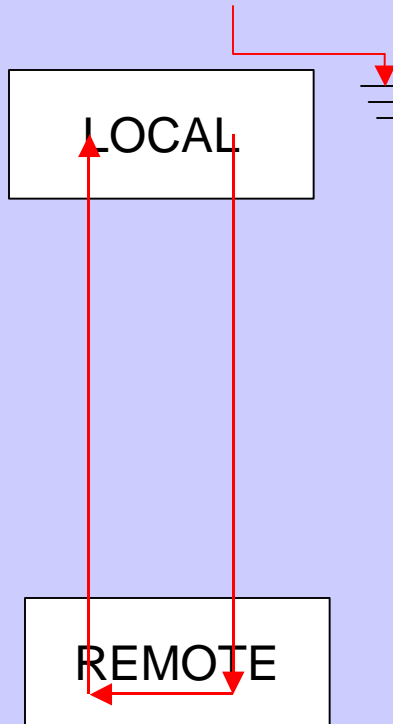


Maintenance: Intrusive troubleshooting



- Interrupt service to troubleshoot
 - Remote Loopback is useful
- Loopback features
 - First, do no harm.
 - Buffer and/or discard user data
 - Do not loop it back to them
- Bad things happen
 - Ex: Token Ring shunting cables

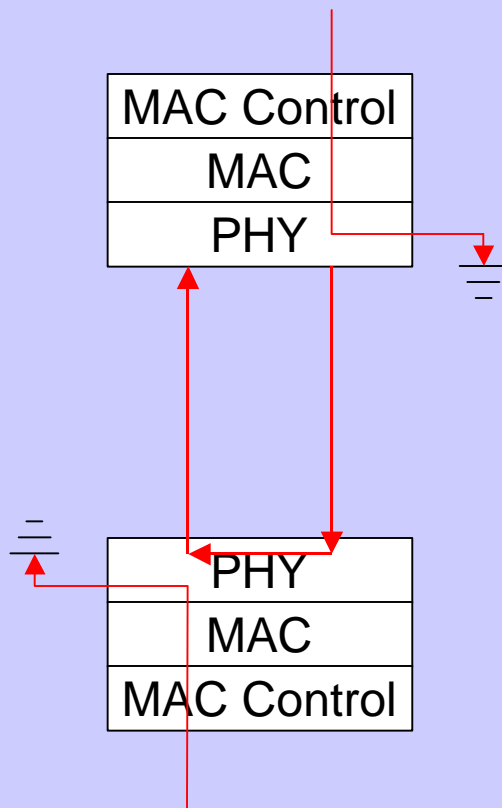
Maintenance: Remote Loopback



- Distributed state problem
 - Local end discard state
 - Remote end loopback state
- Must coordinate the two
 - Even after local power fail
- Best solution: ask the far end

Maintenance: Remote Loopback

- Option #1 : PHY



PROs:

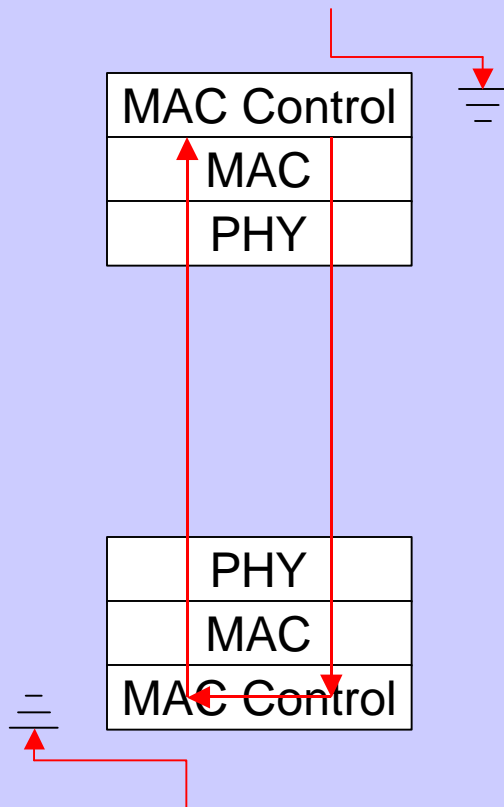
1. No change to MAC Control

CONs:

1. Need PHY communications mechanism
2. Need PHY addressing mechanism
3. Specific to each PHY

Maintenance: Remote Loopback

- Option #2 : MAC Control



PROs:

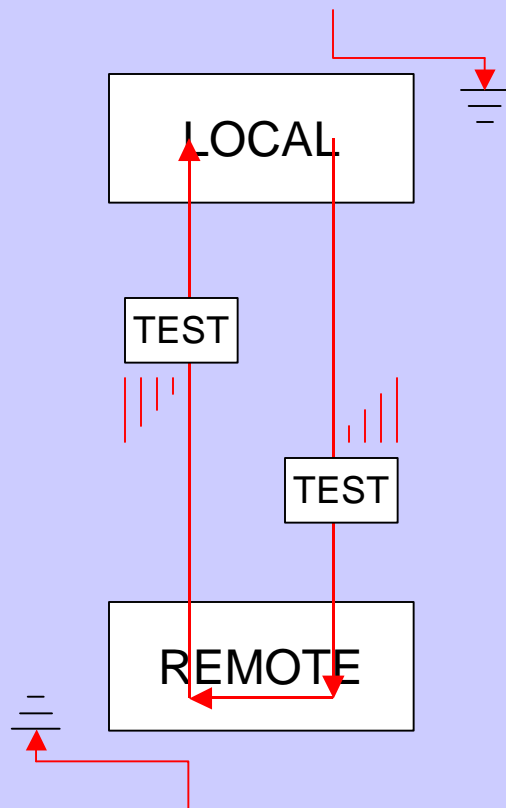
1. Mac Control has an identity
2. Mac Control understands frames
3. Mac Control is PHY independent
4. Mac Control handles I/F to user

CONs:

1. Changes the MAC Control sublayer

Maintenance: Remote Loopback

- Observation : TEST frames



If TEST were universally supported, we'd have most of a solution.

Disconnect user traffic, send TEST frames at desired rate and data pattern.

Recommendations

- Operations
 - New registers for new stuff
 - Far End statistics mechanism
 - History effort with IETF
- Administration
 - Other admin functions should use packets
- Maintenance
 - TEST would be useful, not well supported
 - Mac Control can provide Remote Loopback