Scalable Selective AIS

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Introduction

Non-selective AIS – no information about the unreachable MEPs on upper layers.
- Simple but results in possible incorrect suppression of alarms.

Selective AIS – has information about upper layer unreachable MEPs.
- Accurate, but scales only to a network with limited number of MEPs
- Requires a potentially large MEP List TLV to be sent with each CC message

Proposal: Scalable Selective AIS
- Same benefits as Selective AIS
- But scalable to a large number of MEPs
Proposal: Scalable Selective AIS

Instead of:
One message with a large number of MEP ID’s

Have:
Multiple messages with just 1 MEP ID

UNI MIP will insert the MEPID of the MEP below it in a new CFM message:

- Called SupportAIS – this is not an AIS frame but it supports the functionality of AIS.
- That conveys location of upper level MEPs relative to lower level provider MEPs
- That is Multicast and Non Periodic
When is a SupportAIS frame generated?

SupportAIS frames are not periodic but event-driven. They are generated when:

- MEPs are initialized
- MEPs receive a CC or SupportAIS frame from new MEPs
- MEPs receive a SupportAIS frame with updated information
- Topology Change occurs
  - A fault occurs, Spanning Tree reconfigures (described next)
Generation of SupportAIS frame: when MEPs are initialized

1. MEP1 generates **SupportAIS**
2. MEP2 receives SupportAIS with an NULL BelowMEP field
   - catalogs MEP sending SupportAIS as a local MEP
3. UNI MIP3 stops SupportAIS message and inserts the identifier of the blue provider MEP below (α) in BelowMEP field
4. SupportAIS message is transported across provider network
5. UNI MIP5 does not stop the SupportAIS message because it comes from the provider
6. Customer MEPs receive **SupportAIS** with a non-NULL BelowMEP field

**MEPs in SITE 2** catalog **MEPs in SITE 1** as remote MEPS behind blue provider MEP α
How does Scalable Selective AIS work?

① A fault occurs in the provider network
② CCLoss is detected by provider MEPs
③ Provider MEP generates **AIS** including the identifier of unreachable MEP $\alpha$ with his own identifier (sending MEPID).
④ **AIS** is received by the next higher level MEPs (site 2) and cataloged. It indicates that MEP $\alpha$ is unreachable.

**From SupportAIS**, MEPs in SITE 2 learn that MEPs in SITE 1 are behind $\alpha$. Since $\alpha$ is unreachable, all customer MEPs behind it are unreachable.

This is the same as Selective AIS but with better scalability.
Generation of SupportAIS frame: Topology Change

From **SupportAIS**, MEPs in SITE 2 learn that MEPs in SITE 1 are behind $\alpha$. Working service goes down and alternate link is activated.
Generation of SupportAIS frame:
Topology Change – Link fault

1. Provider MEP sends an **Ethernet AIS** containing α (and its MEPID 1)
2. The network recovered → MEP β receives CCs from MEPs in SITE 1
3. MEP β detects a contradiction:
   - AIS indicates that α is unreachable and so must be all MEPs in SITE 1
   - CC frames from MEPs in SITE 1 indicate reachability of MEPs in SITE 1

MEP β deduces that MEPs in SITE 1 moved and hence a topology change occurred → MEP β must send a SupportAIS frame.
Generation of SupportAIS frame:
Topography change – Port fault

1. Provider MEP sends an **Ethernet AIS** containing α and its own MEPID1
2. The network recovered → MEP δ receives **Ethernet AIS** from MEP1. AIS indicates that α and MEP1 (the one that sent the AIS) are unreachable. δ suppresses alarm for remote MEPs with belowMEP indicating α or MEP1. Alarms are correctly suppressed at δ even if MEP α does not send AIS (port failure).
3. MEP δ detects a contradiction (below) and sends a **SupportAIS:**
   - δ receives CEs from MEPs in SITE 2
   - δ receives Ethernet AIS indicating that MEPs in SITE 2 are unreachable
Benefits of new proposal

Support AIS frame specifies only 1 additional header field encoding only 1 MEP identifier.

Support AIS frame is sent less often than CC (once/sec), Hence it does not consume as much bandwidth.

Hence this solution scales well.
Hardware considerations – merging with CC

Scalable Selective AIS can be implemented in hardware

- Reuse of the CC frame to carry the additional MEP identifier (BelowMep ID)
- The BelowMEP header field is added in hardware.
  - Well suited for hardware → MEP always add the same BelowMEP ID value (Himself) to each CC frame header.