Alarm Suppression

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802.1ag contribution

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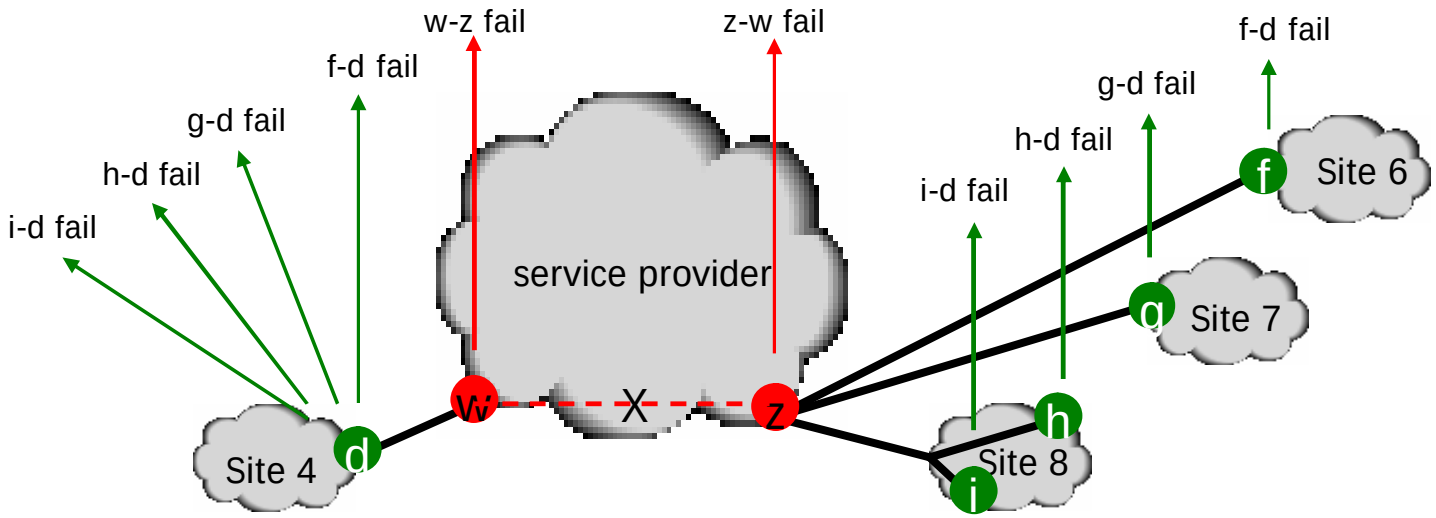
Purpose of Alarm Suppression

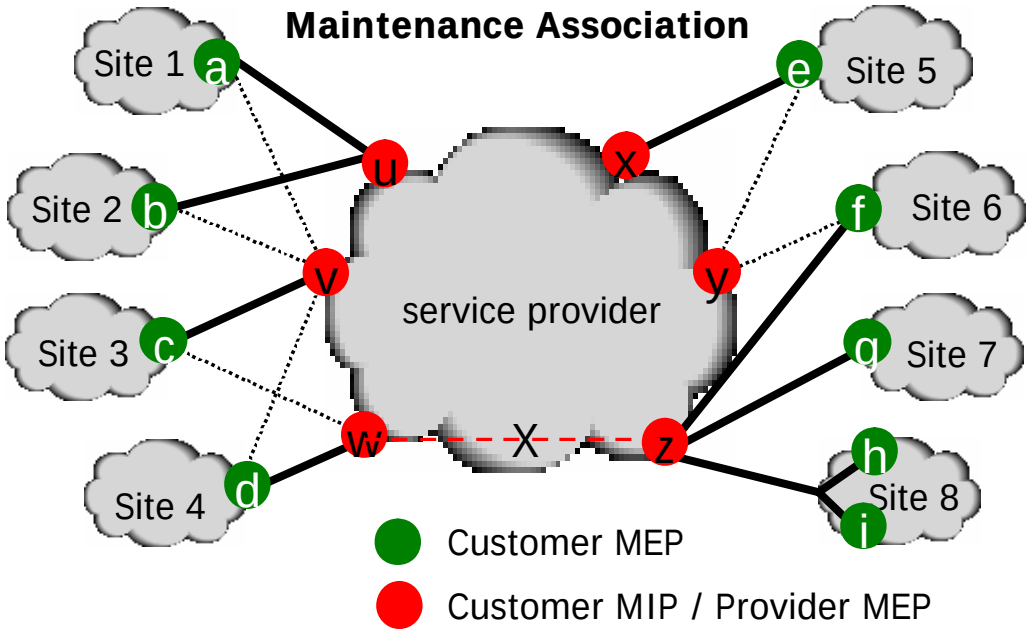


- **On failure of z-w connectivity, cc-timeout of w-z is reported to NMS by w.**
  - **Secondary failures of i-d, h-d, g-d, and f-d connectivity are not reported to NMS by d (ie., suppressed).**
- **Allows operator sees "root cause" of problem.**
  - **All failures shown are due to w-z connectivity failure.**
- **Avoids the performance impact of reporting many alarms during a short period of time.**

Method of Suppressing Alarms

RAST

MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i

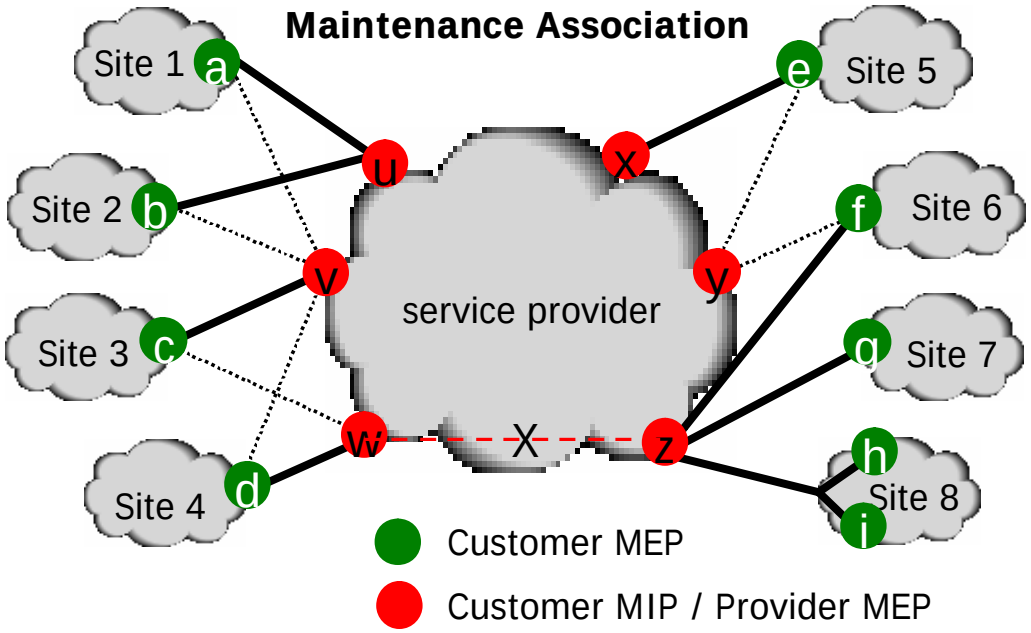


- **A Replicated Alarm Suppression Table (RAST) lists each MIP (left column) that actively provides edge function for one or more MEPs (right column).**
  - **A MEP is active if it has multicast a CCM at the most recent opportunity.**
  - **A MEP is associated with (or is "behind) a MIP if the CCM sent most recently by the active MEP entered the provider network via that MIP.**
- **A cc-timeout occurs at w for z-w.**
- **w reports z-w failure to the NMS.**
- **Remainder of method depends on whether:**
  - **RAST is replicated in every MIP.**
  - **RAST is replicated in every MEP.**

RAST Located in MIP

AST

MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i

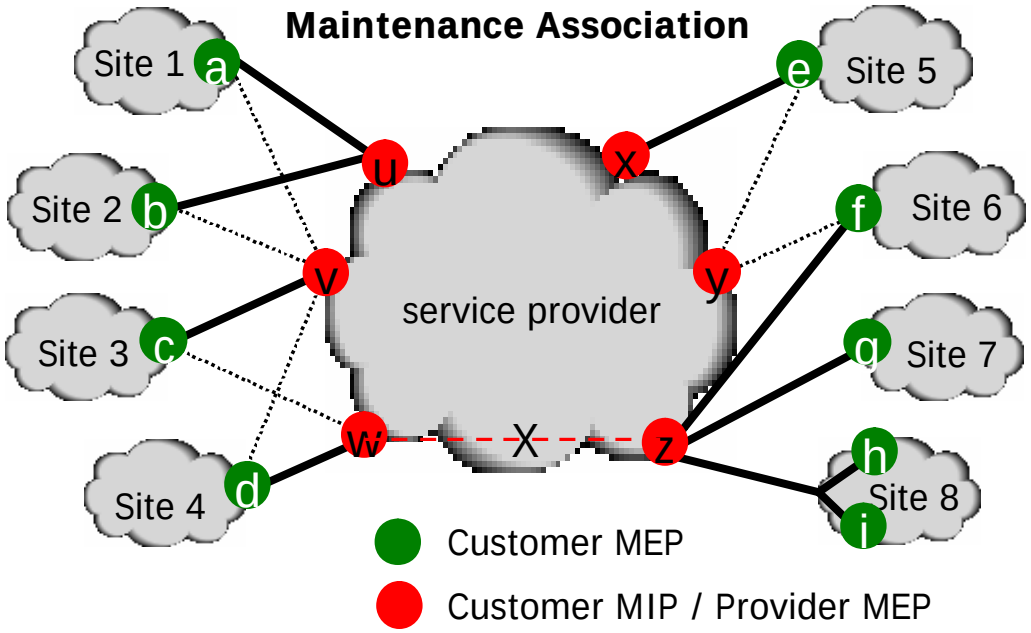


- **w sends AIS Message to d:**
  - **indicating that z-w connectivity has failed.**
  - **carrying the identity of the MEPs (f, g, h, i) behind z.**
- **d saves received information.**
- **A cc-timeout occurs at d for g-d.**
- **Knowledge of z-w connectivity failure and information that g lies behind z implies:**
  - **failure of g-d is secondary to failure of z-w**
  - **Alarm associated with g-d connectivity failure can be suppressed.**

RAST Located in MEP

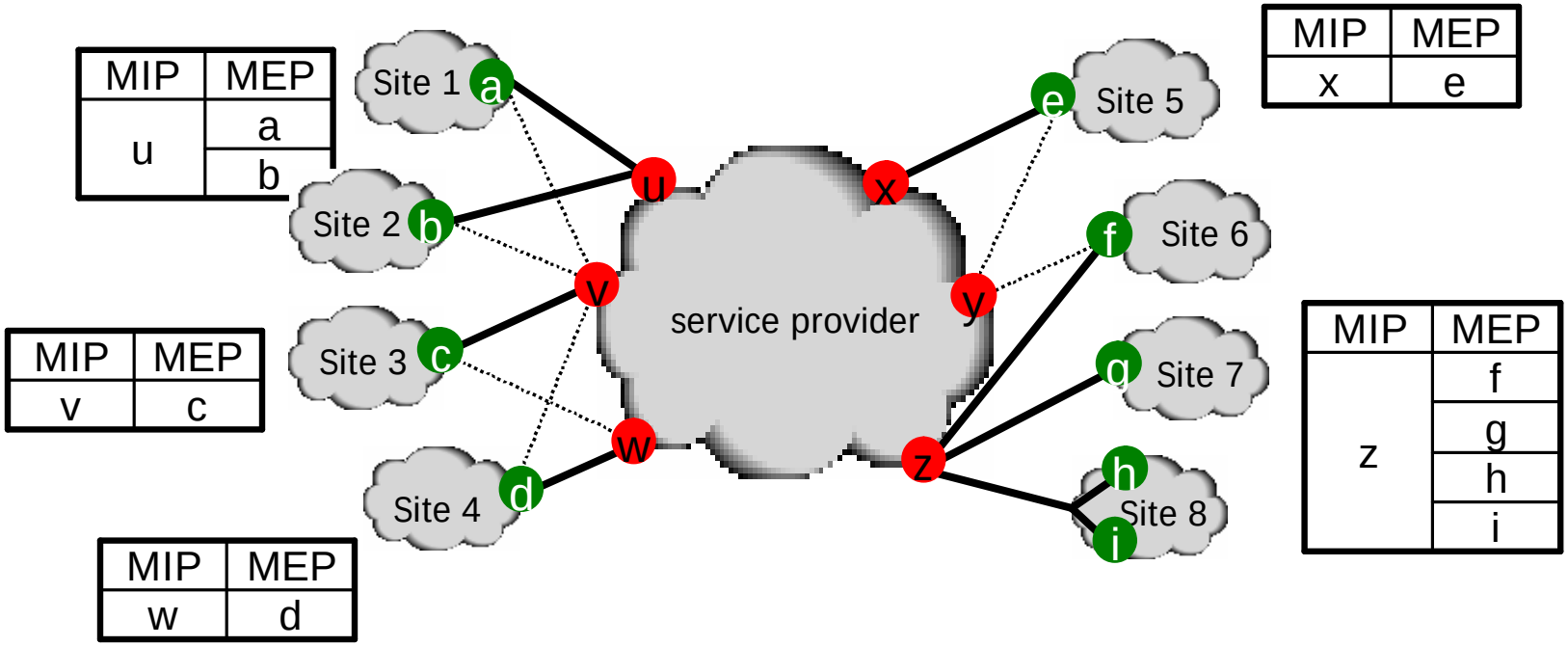
RAST

MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i



- **w sends AIS Message to d:**
  - **indicating that z-w connectivity has failed.**
- **d saves information that z-w connectivity has failed.**
- **A cc-timeout occurs at d for g-d.**
- **D consults AST to learn that g lies behind z.**
- **Knowledge of z-w connectivity failure and information that g lies behind z implies:**
  - **failure of g-d is secondary to failure of z-w**
  - **Alarm associated with g-d connectivity failure can be suppressed.**

Constructing Local AST

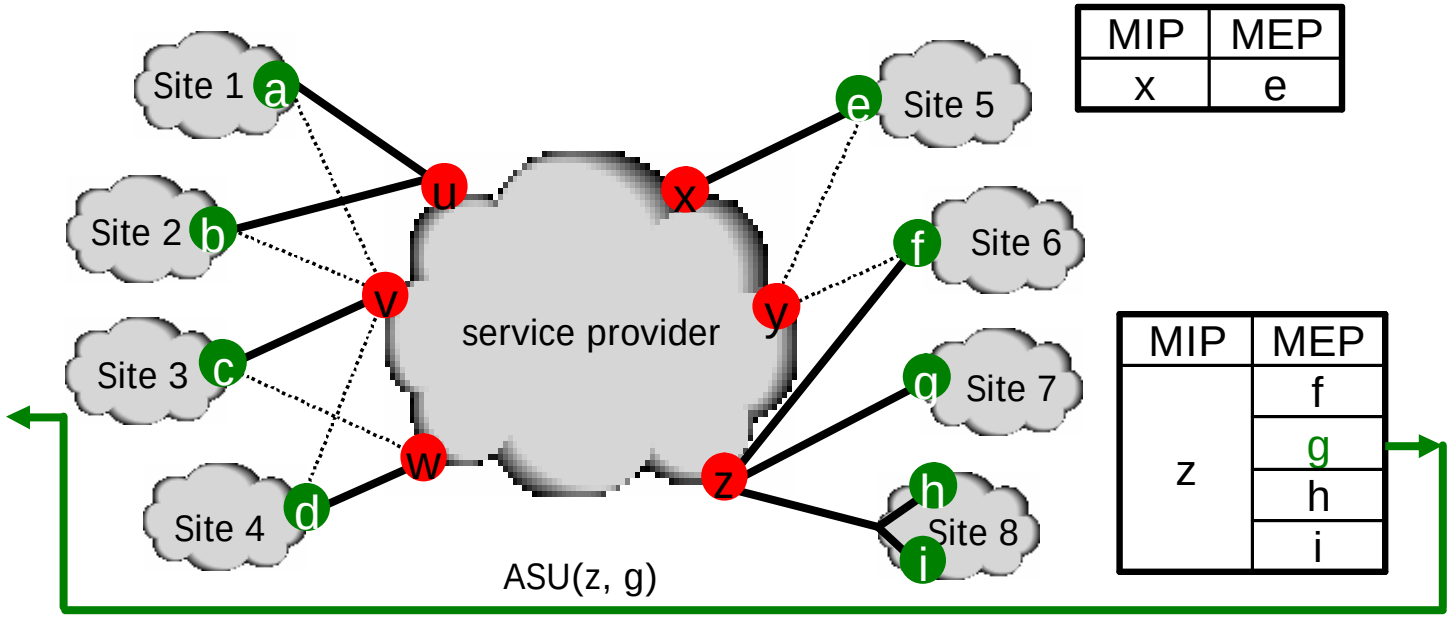


- **A local AST (LAST) is constructed at each active MIP.**
- **The LAST contains only MEPs lying behind the local MIP..**
- **A CCM message sourced by a local MEP and transiting the local MIP is examined by the local MIP.**
- **If the MEPID of the source MEP is not found in the LAST:**
  - **The MEPID is added to an entry in the LAST**

Updating the RAST

RAST

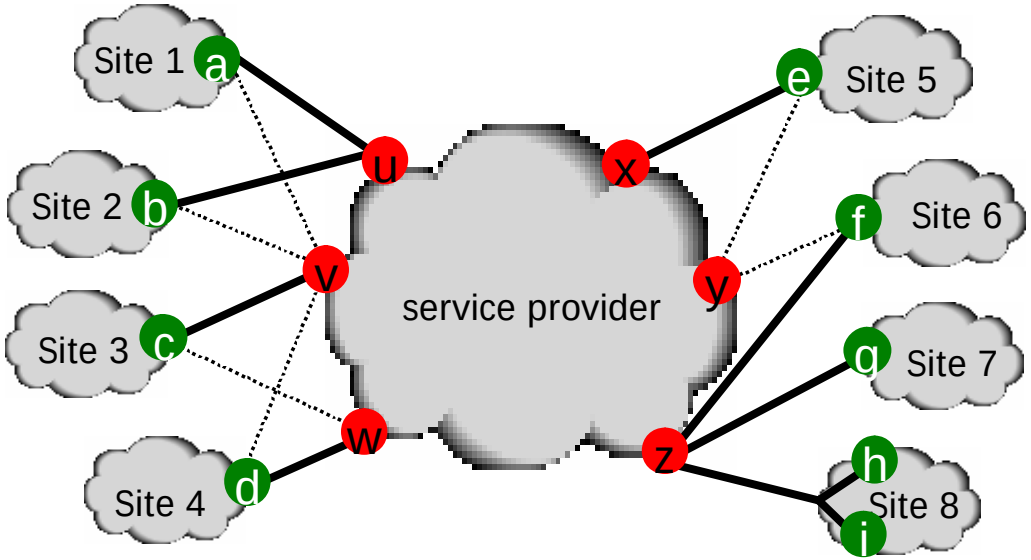
MIP	MEP
u	a
	b
v	c
w	d
	~~g~~
x	e
z	f
	g
	h
	i



- **When a MIP makes a change to its LAST, it multicasts an Alarm Suppression Update (ASU) message to:**
  - **all MIPs (when RASTs are maintained by MIPs)**
  - **all MEPs (when RASTs are maintained by MEPs)**
- **If the MEP value carried by the ASU is found in the RAST, but is associated with a MIP different from that identified by the ASU, the existing MEP value is removed from the RAST.**
- **The (MIP, MEP) pair carried by the ASU as added to the RAST.**

Identifying a MP Joining the MA

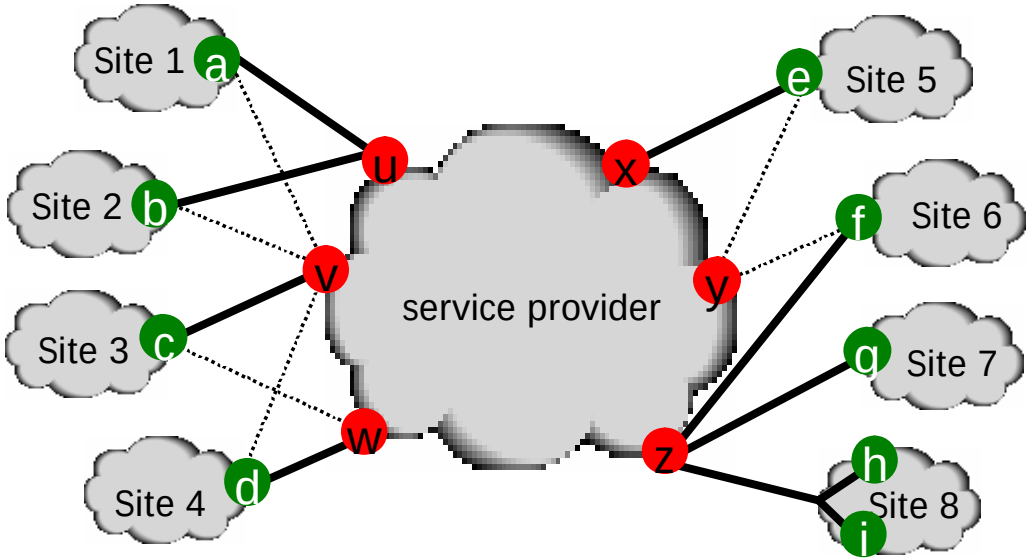
MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i



- **If RAST is maintained by the MIP:**
  - **A MIP is assumed to be joining (or rejoining) the MA if it has not observed a CCM during the past three (or other specific number of) CCM intervals and now observes a CCM.**
- **If RAST is maintained by the MEP:**
  - **A MEP is assumed to be joining (or rejoining) the MA if it has not sent a CCM during the past three (or other specific number of) CCM intervals and now sends a CCM.**

Joining MP Gets Latest RAST

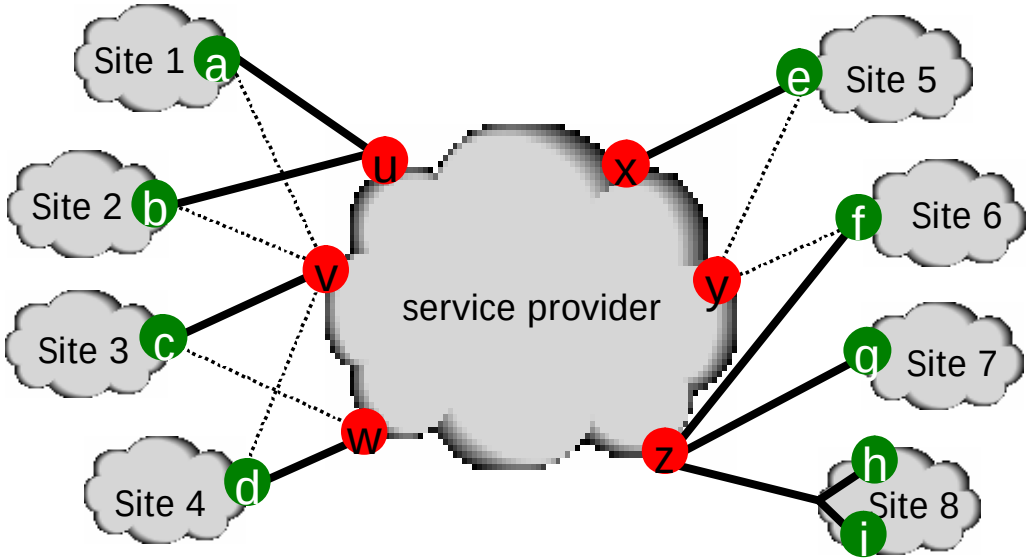
MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i



- **On joining the MA, an MP containing an out-of-date RAST can send a RAST_Request to any other active MP maintaining a RAST.**
- **An MP receiving a RAST_Request responds with an ASU (or ASUs) containing the contents of the RAST.**
- **In the case that the RAST is contained in a MEP, it may be useful to choose as target of the RAST_Request, the MEP from which a CCM has most recently been received.**

Cleanup of LAST and RAST

MIP	MEP
u	a
	b
v	c
w	d
x	e
z	f
	g
	h
	i



- **A LAST entry that has not been confirmed by observation of a CCM from the associated MEP within three CCM intervals, is removed from the LAST.**
- **As with other LAST updates, the change is multicast to allow deletion of the entry in all RASTs.**
- **It is not necessary to explicitly delete entries where the MIP value for a given MEP has changed. Such entries are deleted at the same time that the new value of the (MIP, MEP) entry is installed.**

Observations

- **Event-driven ASU minimizes update required to maintain replicated Alarm Suppression Tables.**
  - **Greatest reduction when RAST maintained in MIPs.**
- **Infer MEPs-behind-MIP from CCM at near-end-MIP.**
  - **Requires no new messages.**
- **RAST in MIP requires that AIS message carried list of MEPs associate with far-end MIP vs. RAST in MEP requires broader scope of multicast.**
- **RAST for added MP is learned from single peer.**
  - **No scaling issues.**
- **Incorporates some features of other proposals.**

Comparing Proposals

	Alarm Suppression Table	**Selective AIS**	**Scalable Selective AIS**
How near-end MIP learns about MEP it serves.	Infer from snooping source address of user-level CCM.	Infer from snooping source address of user-level CCM. (?)	Learn from explicit SupportAIS sent when one of the following occurs: •MEP is initialized •MEP receives CCM from new MEP •MEP receives SupportAIS from new MEP •MEP receives SupportAIS with new info •Topology change
How near-end MIP communicates its own identity.	Sent as source of AST update message	Sent as source of provider-level CCM. (?)	Placed in forwarded SupportAIS message.
When sent from near-end MIP.	When change in MEP behind MIP.	Complete set of MEPs behind MIP sent periodically (?)	When change in MEP behind MIP.

Note: Assume that all schemes could be implemented with MEPs-behind-MIP relationship table maintained in MIPs or in MEPs. If in MIP, then affected far-end MEPs are communicated In AIS from MIP to MEP. So this is not considered as difference in schemes.

Conclusions

- **Activities associated with originating SupportAIS (green shaded box on previous slide) are complex.**
- **Sending complete set of MEPs-behind-MIP on provider-level CCM can require large CCMs (blue shaded box on previous slide).**
  - **If only changed MEPs are sent, then there is little advantage in piggy-backing on the CCM. Just send distinct message (ASU) with changed MEPs.**
- **AST scheme provides best combination of**
  - **(1) event-driven messaging from near-end MIP to far-end MP and**
  - **(2) simplicity of originating messages from the near-end MEP.**