



Stateful power management proposal

Hugh Barrass (Cisco Systems)

Requirements of stateful management

State definitions

- Should be small # of states

- Power mode – consists of set of operating information

- States define how to set or change power mode

Robust state change mechanism

- Need to control state changes...

- ... and be sure of partner's state

- Needs data transfer protocol

- Prefer defined and well-known protocol

Should allow simplifications

- Trade cost vs optimization

Communication protocol

802.3ah OAM

- Slow protocol frames

 - Very small impact on data b/w

 - Not forwarded by bridges

- Clause 57 definition

- Can interrogate Clause 30 MIB objects

- Also includes alarms

Use a query-response mechanism...

- Periodically interrogate partner's state

- State change request and acknowledge

... supplemented with alarms for sudden changes

- Can speed emergency state transitions (e.g. dying gasp)

How to use .3ah OAM

Normative references

- Require support for OAM (maybe allow simple PD exception)

- Define MIB objects to interrogate

- Define timing & sequences for state communications

Also include informative

- Annex showing entire OAM frames for state interrogate and response

Other consideration

- Whether to allow operation using alternate state communication?

States & communication mechanism first priority

- Focus on states first – collect power mode objects later

Power mode objects (PSE & PD)

Some suggestions for discussion...

Not necessary for state & communication definition

Power mode (actual and requested)

actualPeakPower; actualAveragePower; remainingPowerMargin;
requestedPeakPower; requestedAveragePower

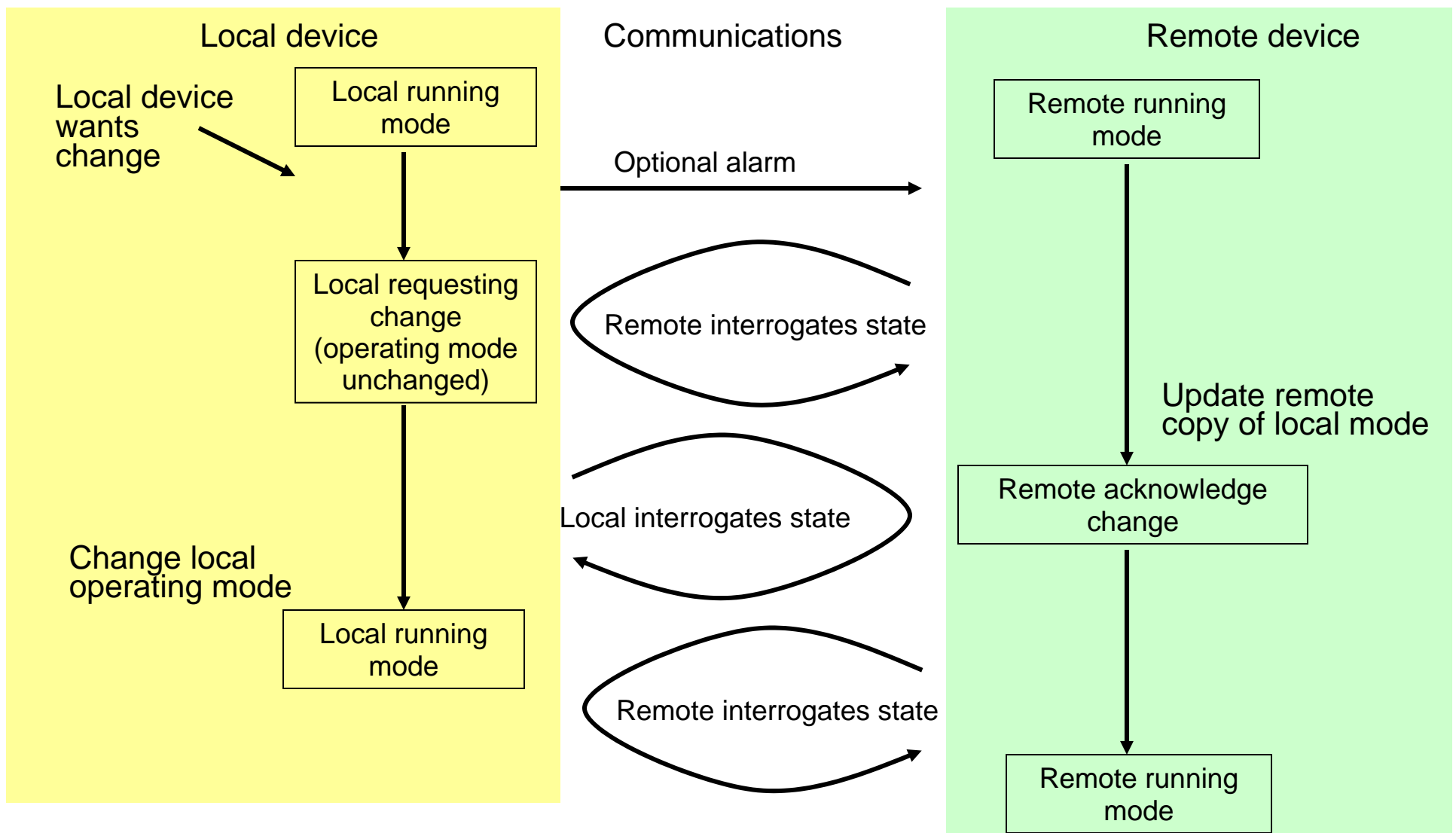
(average could be defined as 10 second moving average)

Other objects TBD; e.g. support for statistical oversubscription

Plus, of course state definitions PSE & PD

State: running; requestingNewMode; acknowledgeChange –
maybe some others

General state change procedure



Detailed state behavior (1)

Periodically interrogate remote state (constantly)

i.e. once per second send interrogate frame & process response

If in running state and remote state changes to requesting state

Observe remote requestedPower objects

Change to acknowledge or non-acknowledge state

(depending on acceptance of change)

If acknowledge, change local copy of remote requestedPower objects

If remote state changes to running

Change to running state

Detailed state behavior (2)

If in running state and local device wishes to change

- Interrogate remote device, confirm in running state

- Set local requestedPower objects

- Change to requesting state

- (optionally send alarm)

If remote state changes to acknowledge

- Change operating power mode; update local actualPower objects; change to running state

Else if remote state changes to non-acknowledge

- Do not change operating power mode; change to running state

Detailed state behavior (3)

Collision event

In requesting state, remote changes to requesting state

Do not change operating power mode; change to running state

PSE

Initial state

After power up, use L1 classification as first actualPower mode
(both local and remote)

Loss of communication

If no response for TBD interrogations assume dead partner

Procedure TBD – to define explicitly for PSE & PD

Persist or vacillate

State definitions require that each request must be acknowledged or denied before returning to running state

The requestor must not de-assert request until ack/non-ack

The partner must respond to request as soon as it is seen

The requestor may persist or vacillate after non-ack

Simply re-assert request - TBD delay before repeat request

Not re-assert denied request or request reversal change

NB some offers cannot be refused!

PSE might withdraw power if necessary

More stuff...

Do we need a “deep sleep” mode

- PD does not communicate, maybe link down

- PSE allocates enough power to restart

Graceful power withdrawal

- PSE request change to 0 power

- Allows PD to indicate controlled power-down

Minimal PD behavior TBD (dumb PSE already defined)

- No support for OAM = always stick in initial state

- (Equivalent to .3af for lower power)

- Only respond to OAM = request 1 operating mode & stick there

- (no possibility of PSE requested change)

Next steps

Turn this into a complete normative definition

Not feasible in PowerPoint

Write informative descriptions of frames

Based on Clause 57

Make list & definitions for power mode objects

actualPeakPower; actualAveragePower; remainingPowerMargin;
requestedPeakPower; requestedAveragePower

Address TBDs

Loss of communication (PSE & PD) behavior; deep sleep mode;
simplified PD behavior; etc.

Questions...



... or comments