Timescale correlation service for IEEE 802.1AS

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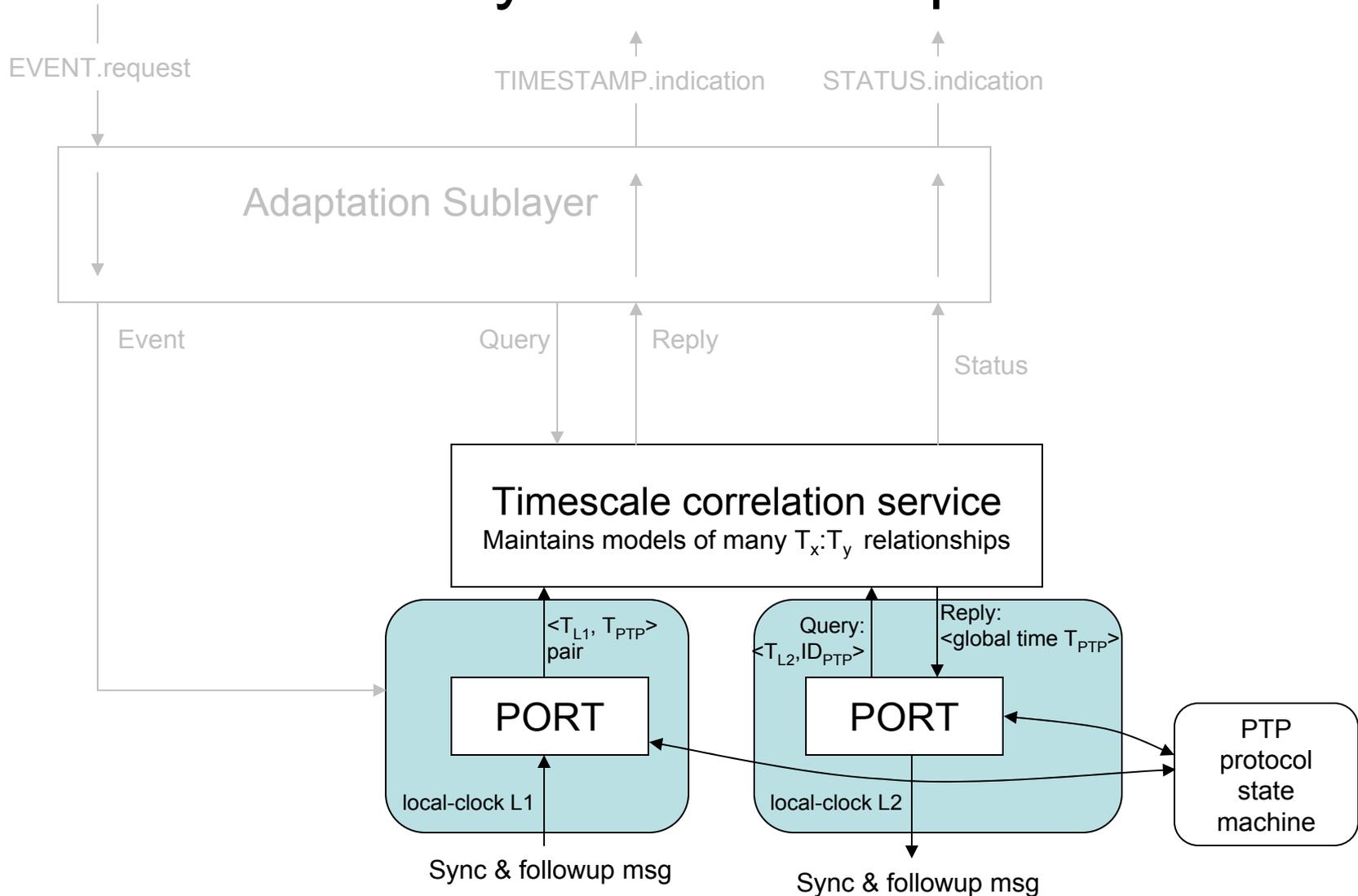
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A Timescale Correlation Service reference model

- A well-defined service which maintains correlation models among several timescales (local and global), each with its own ID
- "correlation model" between ordinary timescales =
  - Epoch offset
  - Frequency offset (i.e. ratio)
  - Frequency ratio drift rate (if desired)
- No "real time" performance specification: the timescale correlation service abstracts a mathematical behavior (i.e. interpolation)
- Also supports "pseudo-timescales", which are merely event sequences, within same syntax
- One type of data-input message
  - Cross-timestamp: T_x on timescale ID_1 = T_y on timescale ID_2
- One type of query/response message
  - What value of ordinary-timescale ID_1 matches T_q on timescale ID_2?
  - If ID_2 is an ordinary timescale, T_q may have any value
  - If ID_2 is a pseudo timescale, T_q must be a previously-acquired event

Timescale correlation reference model 1: PTP Sync & Followup flow

EVENT.request

TIMESTAMP.indication

STATUS.indication

Adaptation Sublayer

Event

Query

Reply

Status

Timescale correlation service
Maintains models of many $T_x:T_y$ relationships

$<T_{L1}, T_{PTP}>$ pair

Query: $<T_{L2}, ID_{PTP}>$

Reply: $<$global time $T_{PTP}>$

PORT

PORT

local-clock L1

local-clock L2

PTP protocol state machine

Sync & followup msg

Sync & followup msg

Timescale correlation reference model 2: Establishing local inter-domain sync

EVENT.request

TIMESTAMP.indication

STATUS.indication

Adaptation Sublayer

Event

Query

Reply

Status

Timescale correlation service
Maintains models of many T_x:T_y relationships

$<T_{L1}, T_{E0}>$ pair

$<T_{L2}, T_{E0}>$ pair

$_{E0}$PORT

$_{E0}$PORT

PTP protocol state machine

Scheduling of this event is non-critical

Shared sync event

local-clock L1

local-clock L2

Sync & followup msg

Sync & followup msg
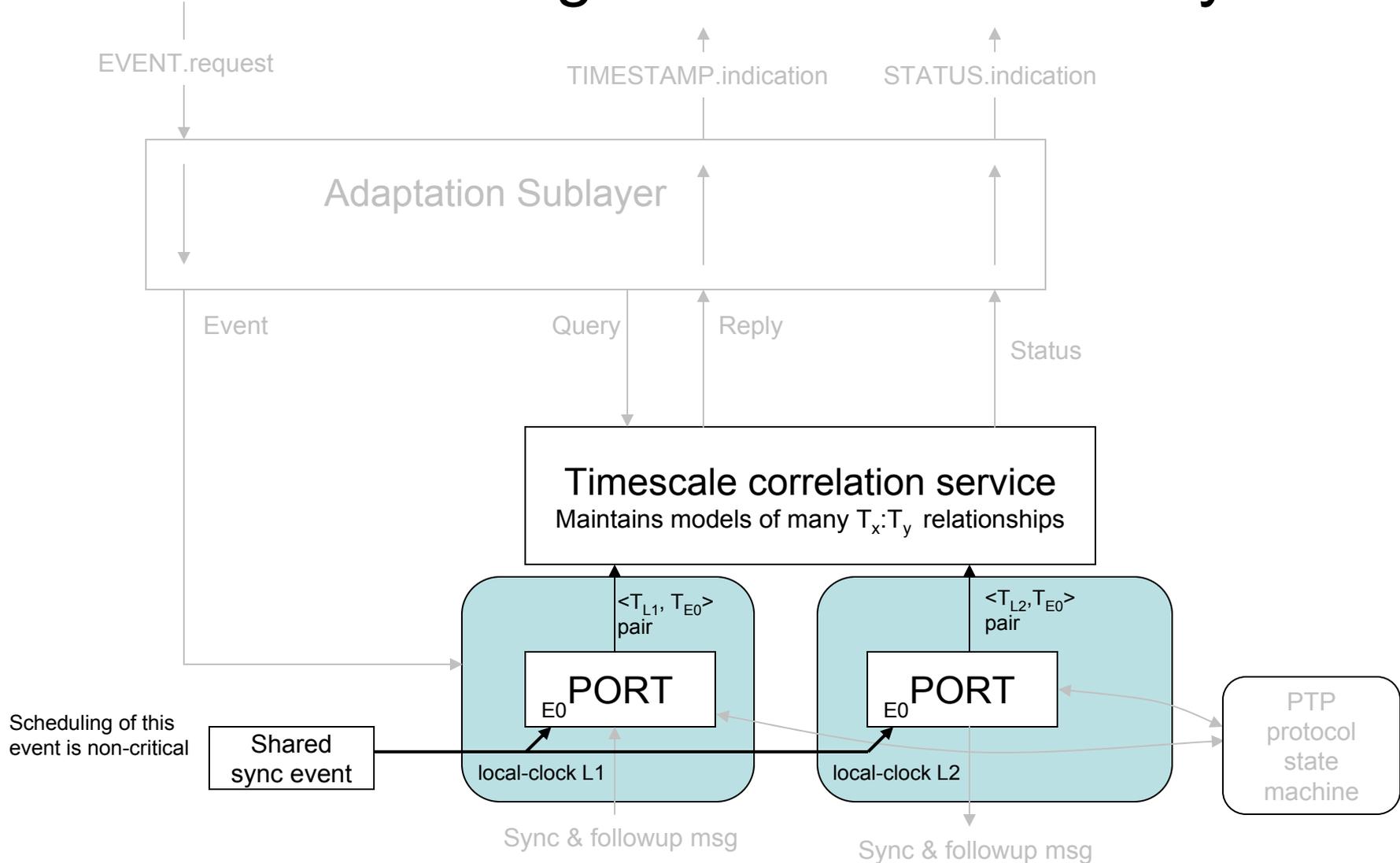
Timescale correlation reference model
3: Application Service

EVENT.request

TIMESTAMP.indication

STATUS.indication

Adaptation Sublayer

Event

Query:
<pseudo time T_{E1}, ID_{PTP}>

Reply:
<global time T_{PTP}>

Status

Timescale correlation service
Maintains models of many T_x:T_y relationships

<T_{L1}, T_{E1}>
pair

E1 PORT

PORT

PTP
protocol
state
machine

local-clock L1

local-clock L2

Sync & followup msg

Sync & followup msg