

IEEE 802.1ASbt and Next Generation Ethernet Time Synchronization

Michael D. Johas Teener

Sr. Technical Director / Plumbing Architect

Broadcom Corporation

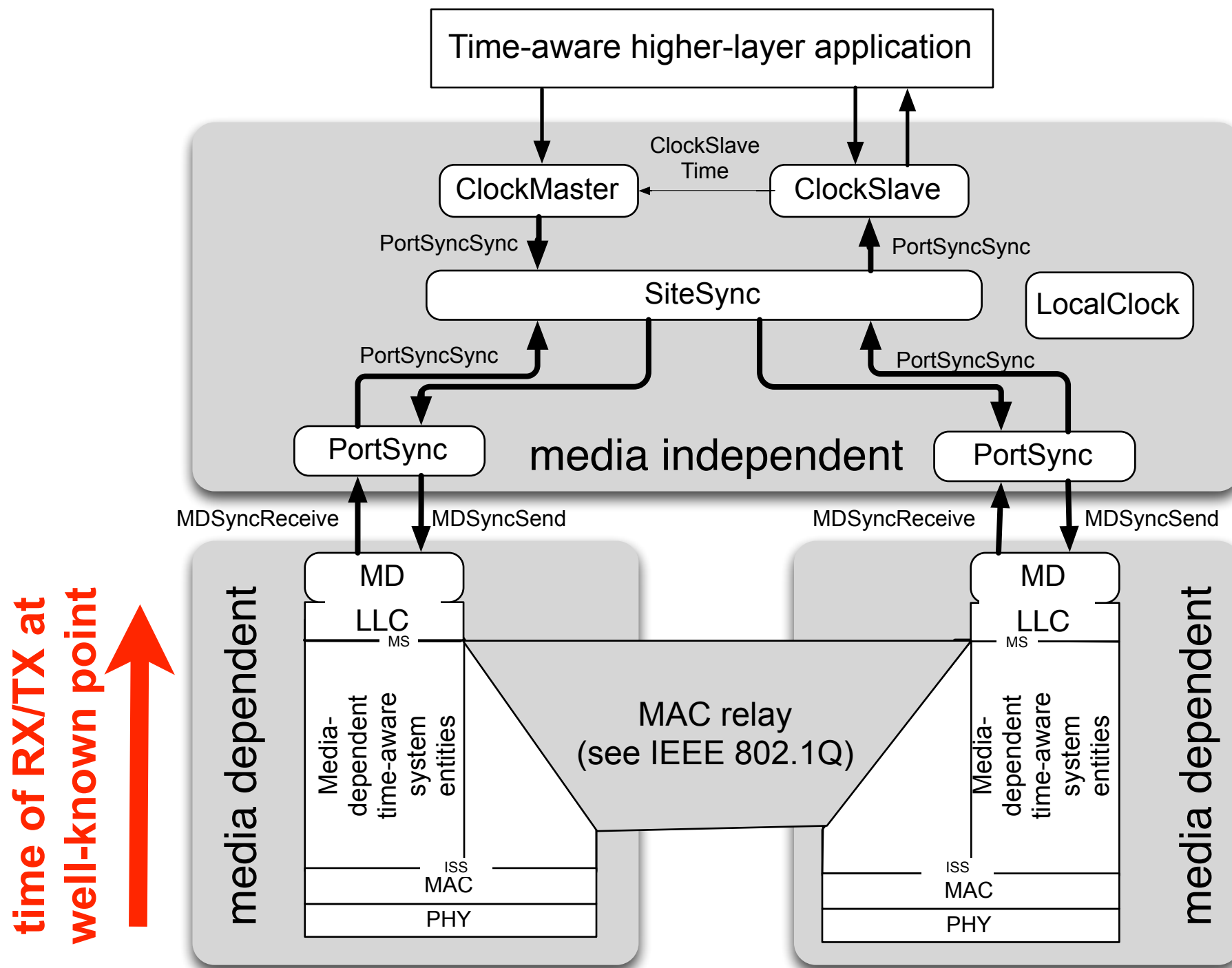
Agenda

- What is 802.1AS?
- What would we like to improve?
- Time synchronization unification
- Requirements for Ethernet physical layers
- Schedule & status

IEEE 802.1AS is ...

- ... both a subset and superset of the IEEE 1588 “Precision Time Protocol”
 - Profile of Std 1588-2008 for Ethernet, a much simplified subset
 - Compatible enhancements for much faster clock locking and easier/ lower cost filtering at endpoints
 - ... but a superset of Std 1588-2008 to support 802.11 WiFi, EPON and “coordinated shared networks”

Architectural model



IEEE 802.1ASbt

- ... is a revision to 802.1AS to
 - Enhanced link support
 - Support for *all* of Ethernet
 - Other layer 2 links of interest
 - Improve performance and usability
 - Responsiveness and reliability
 - Scalable to larger / more difficult topologies
 - Enable protocol unification
 - End the 1588 vs 802.1AS vs NTP confusion

Layer 2 compatibility

- Support for link aggregation (IEEE 802.1AX)
- *Work with 802.3 on multi-lane timestamp reference point*
- Support for other media:
 - IEEE 1901, WiFi Direct, etc
 - (if changes are needed)

Improved scalability

- One step processing
 - For both synch and peer delay
 - Fully backward compatible with two-step
- More responsive
 - Pre select a failover Grand Master so the selection when needed is faster
 - Support both hot and cold standbys
 - Reduce BMCA convergence time for large network
- Redundancy
 - Short reconfiguration w/redundant paths when one path fails
 - Multiple active Grand Masters for the same domain

Initialization & configuration

- Aid for measurement of link delay asymmetry
 - “reverse links and remeasure”
- Reliably detect buffered repeaters
 - Need an alternate mechanism for long (fiber) links
 - *MAC control frames?*

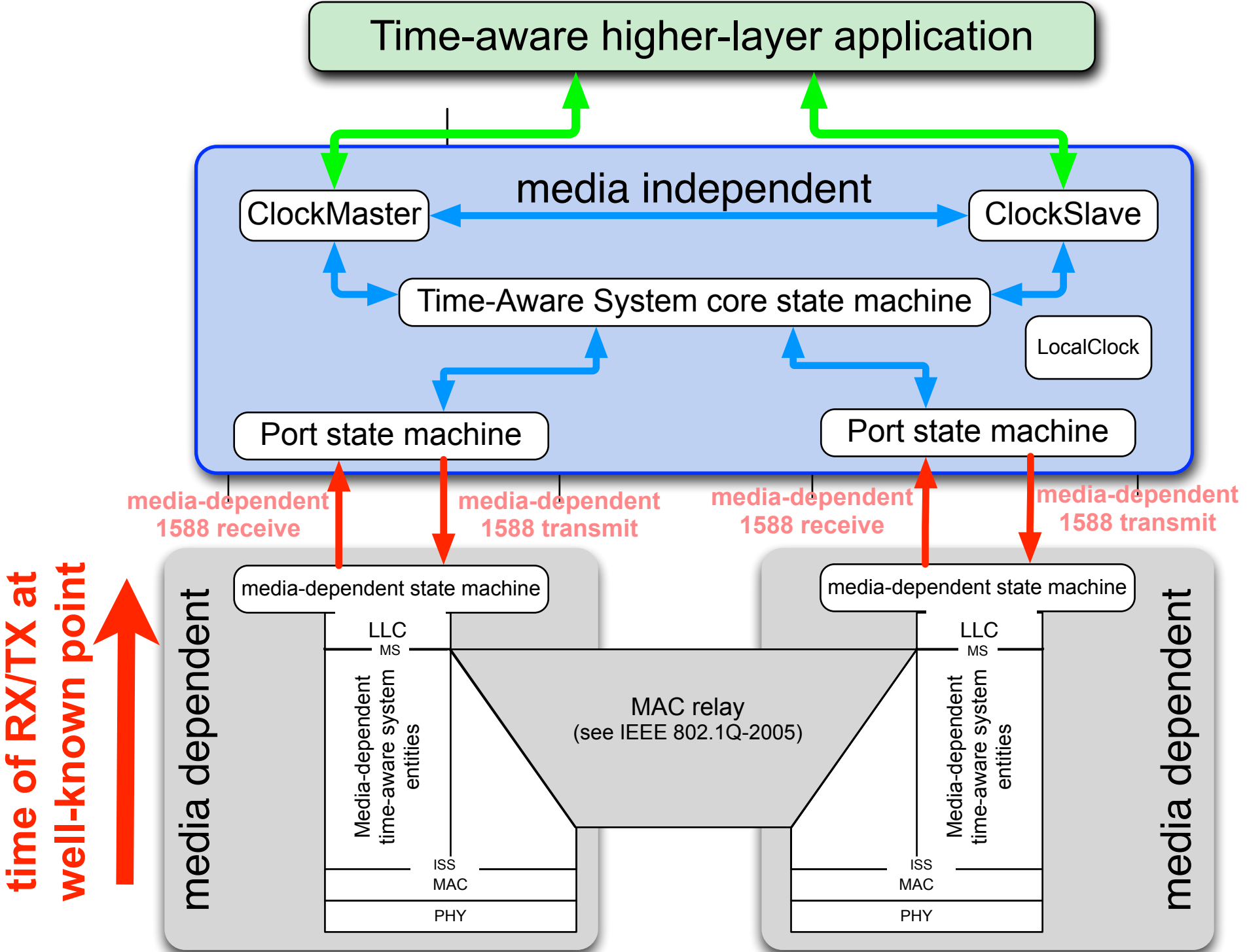
Additional features

- Multiple domains with synchronization information
- Accuracy reporting
 - Each bridge to report its worst case Time Stamp accuracy
 - GM-to-ordinary-clock path synchronization reporting

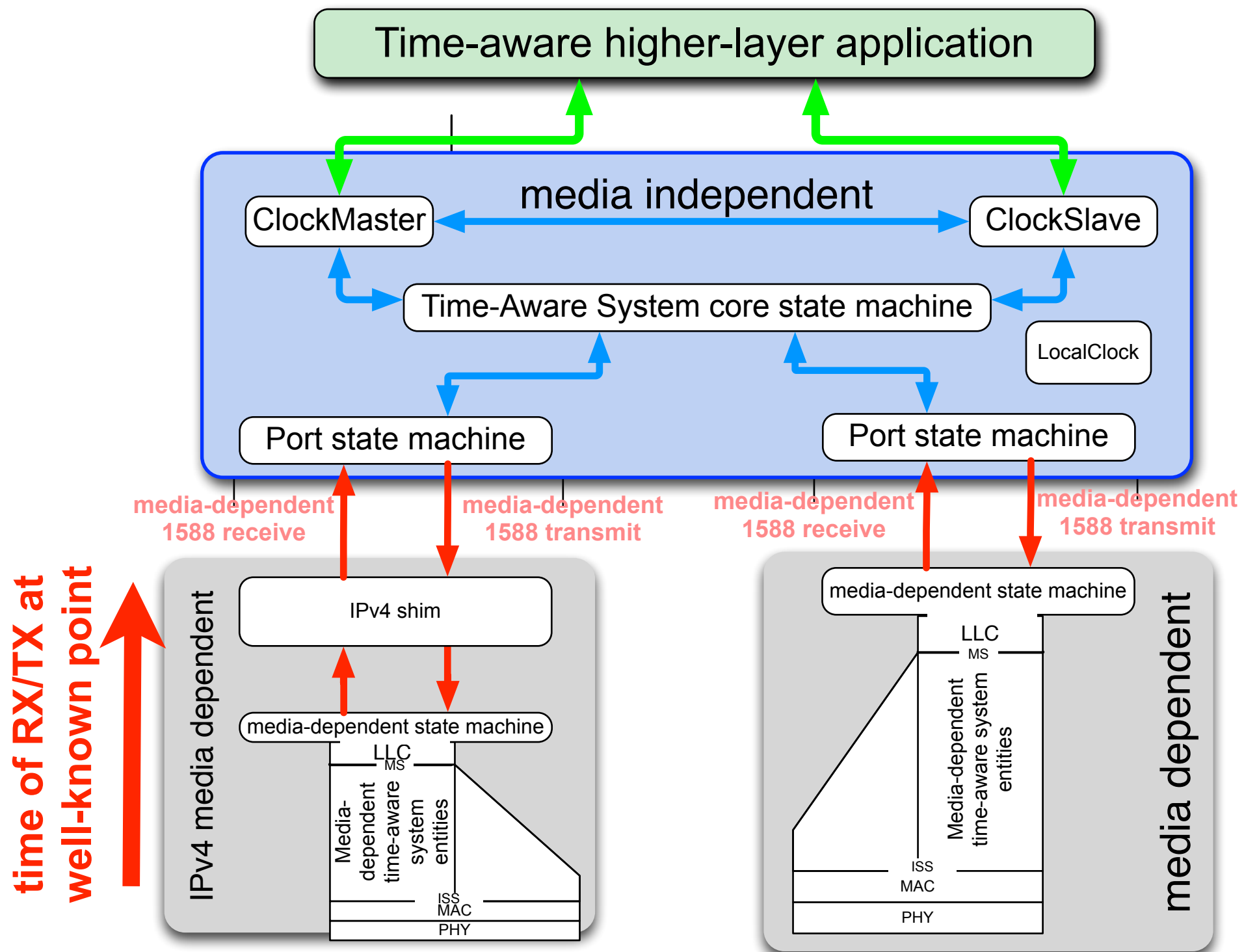
Protocol unification

- Provide L2 timing information for 1588 revision
 - Merge 802.1AS and 1588 architectures
- Work with 1588 to provide end-to-end quality information
 - Common service interface and information exchange
- Move media-independent layer out of 802.1AS?

A unified architecture



A unified architecture



Physical layer requirements

- Need a well known measurement point for “start of frame”
 - accuracy of PTP directly corresponds with the accuracy (repeatability/precision) of the measurements
 - symmetry between directions is important
- Check out the White Rabbit implementation for ideas
 - http://www.ieee802.org/802_tutorials/2013-07/WR_Tutorial_IEEE.pdf slides 22-28

Schedule and status

- IEEE 802.1ASbt “assumptions” list almost complete
 - Drafts can start at that time
 - May depend on 1588 schedule
- IEEE 1588 revision just started
 - First web meeting next week
 - First FtF in Lemgo, Germany, Sept 27-28, 2013
 - Just after ISPCS '13