

# QNgin S-FSM



## PTP Slave for Qualcomm FSM9016-based Small Cells

### APPLICATIONS

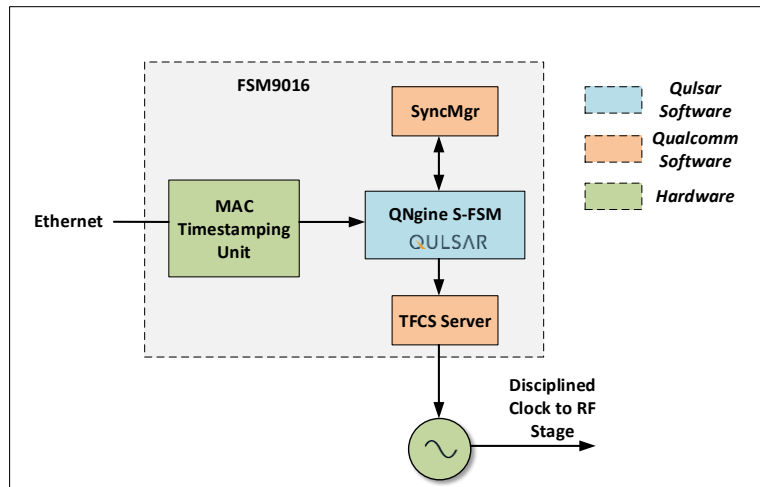
- Residential femtocells
- Enterprise small cells
- LTE-FDD, LTE-TDD and LTE Advanced

### FEATURES

- Works with standard FSM9016-based small cell designs
- Provides full IEEE 1588-2008 (PTP) slave solution
- Industry-leading IEEE 1588 time & frequency recovery algorithms
- Integrates into Qualcomm Sync Manager framework to coexist with alternate sync sources
- Controls system timing VCTCXO via Qualcomm TFCS server to reduce hardware dependency
- Supports unicast and multicast addressing
- PTP-over-UDP/IP (layer 3) operation
- Industry leading algorithm for phase recovery on noisy networks
- Compliant with ITU-T G.8265 and G.8275.2 PTP profiles
- Frequency alignment to typically better than 10 ppb, and time alignment to better than 1.1  $\mu$ s over a five-hop, non-PTP aware, network
- Configurable by application code
- Key-based node-locked licensing

### BENEFITS

- Easy & rapid integration in new and existing small cell designs
- Cost effective solution
- Provides time and frequency synchronization for air interface (LTE-TDD) and application layer (geolocation etc.)
- Fully compliant PTP stack and industry-leading advanced time-recovery servo provide functionality and performance beyond that of open-source solutions



QNgin S-FSM consists of an application-layer PTP solution supplied as an object library that the small cell vendor can integrate into their existing FSM9016-based design. An example application showing how to configure and control the PTP functionality is also supplied in source code form.

The PTP engine includes both a fully-compliant PTP stack, which implements the PTP protocol for communicating with a remote PTP master or boundary clock, and an advanced time-recovery servo that takes the timestamps generated by the PTP stack and uses these to align the tick rate and time of the small cell to match that of the master to within a high degree of accuracy. The PTP function uses the timestamping and 1PPS (pulse per second) capabilities of the Qualcomm FSM9016 SOC and achieves time and frequency alignment by adjusting the frequency of the system's voltage-controlled master oscillator through the Qualcomm TFCS server abstraction layer. This allows the oscillator to drive the RF stage while meeting both phase noise and frequency accuracy requirements.

The application-layer design of QNgin S-FSM allows it to be integrated into the majority of FSM9016-based designs with no customization. However, in the case that non-standard or additional functionality is required design-specific customization may be an available option. License control of QNgin S-FSM is handled on a node-locked basis using either unique ID or system MAC address, eliminating the need to maintain an on-line license server.

QNgin S-FSM pricing is structured on the basis of a one-off design license fee and a nominal per-unit royalty, and includes integration support and performance testing by Qulsar. An optional extended maintenance agreement provides for ongoing support and feature updates.