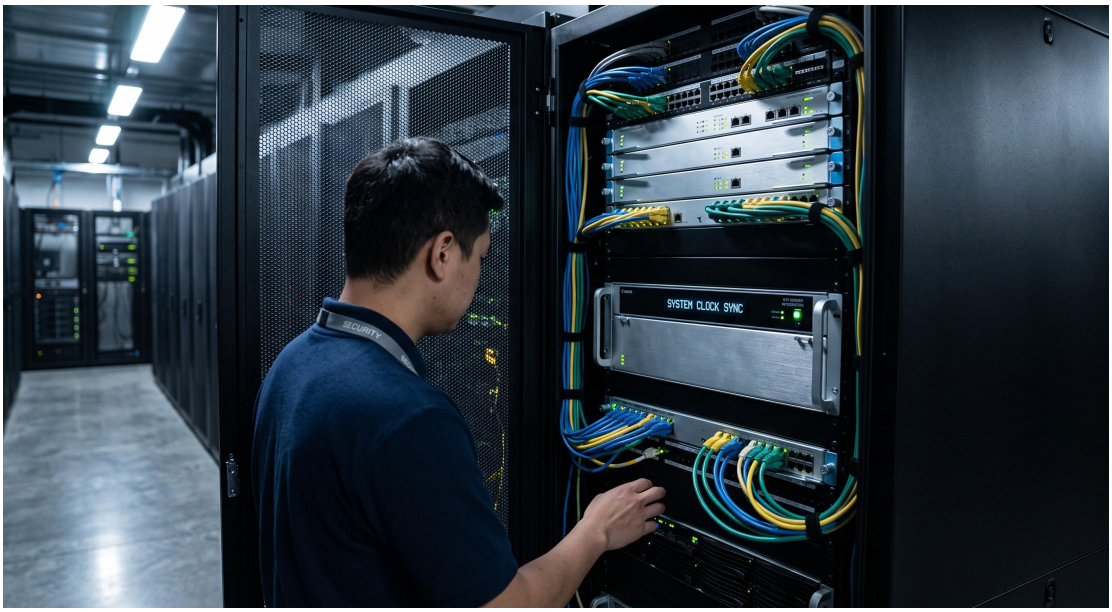
ZTE C300 OLT System Clock Sync and NTP Server Integration Standards - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the synchronization architecture and Network Time Protocol (NTP) server integration standards governing the ZTE C300 Optical Line Terminal (OLT) system. As a carrier-grade platform designed for next-generation passive optical networks (NG-PON), the C300 OLT demands precise phase and frequency alignment to ensure seamless delivery of high-bandwidth, low-latency services, including mobile backhaul, enterprise VPN, and residential triple-play. This datasheet details the hardware-level clocking mechanisms, the comprehensive synchronization portfolio (including Synchronous Ethernet and IEEE 1588v2), and the stringent integration guidelines for external NTP servers, affirming the C300's role as a reliable time-aware anchor in the modern telecommunications infrastructure.



HARDWARE ARCHITECTURE & SILICON

The ZTE C300 leverages a robust, distributed hardware architecture with dedicated silicon for clock recovery and distribution. At its core, the system integrates a high-precision Stratum 3E-grade local oscillator, capable of maintaining holdover performance of better than 1.5 microseconds over a 24-hour period in the absence of an external reference. The backplane is engineered with a low-skew clock distribution tree that delivers synchronized timing signals to every line card and service module with a phase error of less than 5 nanoseconds between slots. The central clock card (CCU) houses the primary timing processing unit, which supports multiple input references, including BITS (Building Integrated Timing Supply), 1PPS (Pulse Per Second), and ToD (Time of Day) formats, converting them into a unified system clock that drives the synchronous Ethernet and time-stamping engines across the chassis.

KEY FEATURES & ROUTING LOGIC

The ZTE C300 OLT System incorporates a multi-layered synchronization engine that operates as follows:

- Synchronous Ethernet (SyncE): The system supports full ITU-T G.8261/G.8262 compliance, enabling frequency synchronization over the physical Ethernet layer. This feature ensures that the OLT can propagate high-quality clock signals from the core network down to the optical network terminals (ONTs) without relying on packet-based recovery, significantly reducing phase noise and wander.

- IEEE 1588v2 Precision Time Protocol (PTP): The C300 acts as a boundary clock (BC) and transparent clock (TC), implementing the full suite of PTP profiles, including G.8275.1 (Telecom Profile for Phase/Time). The hardware time-stamping engine operates at the physical layer (PHY), providing sub-microsecond accuracy for time-sensitive applications such as 5G TDD synchronization.

- NTP Server Integration: The system supports the integration of external NTP servers (v3/v4) via dedicated management interfaces. The NTP client module features a sophisticated jitter buffer and filtering algorithm (combining PLL and FIR filter stages) to discipline the local system clock against stratum 1 or 2 servers. The system is capable of achieving time synchronization accuracy of

under 10 milliseconds in the majority of WAN deployments, with a polling interval dynamically adjusted between 64 and 1024 seconds based on network conditions.

- Redundant Timing Sources: The platform allows configuration of up to four independent reference sources (BITS, PTP, NTP, and local oscillator) with automatic source selection and holdover logic, ensuring carrier-class reliability (MTTR < 30 minutes for clock failures).

COMPLIANCE & STANDARDS

The ZTE C300 OLT System Clock Sync and NTP integration adheres to a comprehensive portfolio of global industry standards to guarantee interoperability and performance:

- ITU-T G.8261/Y.1361 (Timing and synchronization aspects in packet networks)
- ITU-T G.8262/Y.1362 (Synchronous Ethernet equipment slave clock)
- ITU-T G.8273.2 (Timing characteristics of telecom boundary clocks and time-aware systems)
- IEEE 1588-2019 (Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems)
- RFC 5905 (Network Time Protocol Version 4: Protocol and Algorithms Specification)
- ETSI EN 300 462 (Generic requirements for synchronization networks)

- MEF 22.1 (Mobile Backhaul Phase 2 Implementation Agreement)

TECHNICAL SPECIFICATIONS

The hardware specifications of the ZTE C300 synchronization subsystem are detailed below. These parameters define the platform's capability to serve as a robust time source in the access network.

- SYSTEM FREQUENCY ACCURACY: Within +/- 4.6 ppm in free-run mode; within +/- 1 ppb when locked to a valid SyncE or 1588 reference.
- PHASE ACCURACY (PTP): < +/- 100 ns relative to the grandmaster (when operating as a Boundary Clock), with a maximum time error (MTE) of 1.5 microseconds for a 24-hour holdover period.
- SYNCHRONOUS ETHERNET (SYNCE) OUTPUT: Supports clock output on all 10GE/GE data ports via the recovered clock mechanism; compliant with SSM (Synchronization Status Message) handling.
- NTP SPECIFICATIONS: Supports client mode and symmetric active mode; MD5/SHA-1 authentication for security; supports unicast and broadcast NTP server discovery; maximum NTP packet processing rate: 500 packets per second.
- MANAGEMENT INTERFACE: CLI, NETCONF/YANG, SNMPv3; dedicated out-of-band management port for NTP/clock configuration.

- PHYSICAL INTERFACES FOR EXTERNAL CLOCK: RJ-45 (1PPS/ToD), 75-ohm coaxial (BITS/E1/T1) via a dedicated clock input module.

- OPERATING TEMPERATURE RANGE: -5°C to +55°C (long term); -25°C to +70° C (short term, up to 16 hours).

- RELATIVE HUMIDITY: 5% to 95% (non-condensing).

- MTBF: 185,000 hours (calculated at 40 ° C ambient, according to Bellcore SR-332).

Parameter	**Specification**
Form Factor	Modular 12-slot Chassis (Central Clock Card Redundancy)
Switching Capacity (Clock Bus)	Dedicated 1.0 Gbps synchronization backplane with <2ns slot-to-slot skew
Power Supply	Dual Hot-Swappable Redundant AC/DC (DC: -48V; AC: 100-240V, 50/60Hz)

