

Application Note

Economical Timing Distribution Using the flexiHaul M6424 TSN Switch



Application Benefits

- 30% cost and 35% footprint advantage compared to traditional timing distribution appliances
- Compact, temperature-hardened platform for deployment flexibility
- Dual-purpose PTP timing distribution appliance and xHaul platform that simplifies planning, engineering, and operations

Functional Elements

- HFR flexiHaul M6424 TSN switch with Grand Master/Master timing source
- HSN8800 Element Management System

Application Summary

The flexiHaul M6424 TSN Switch is an excellent option for timing distribution using IEEE 1588v2 Precision Time Protocol (PTP) and SyncE. The M6424 is a more economical solution for timing distribution fanout than typical PRTC/ePRTC appliances. The platform is also a superior choice for multiservice RAN xHaul Time Sensitive Networking (TSN).

This application complements evolution from distributed to centralized timing and synchronization (T&S) architecture. The key attributes of the M6424 as a timing distribution appliance are:

- Hardware-based timing yielding high performance class C/D operation
- High-density 24 × 10 GbE port fanout in a compact 1RU footprint
- Temperature-hardened NEBS3 platform for deployment flexibility

Critical Timing and Distribution Infrastructure for Mobile Broadband Networks

Timing and synchronization is a critical part of today's mobile broadband (MBB) networks. These mobile networks must be synchronized to optimize tower coverage, minimizing interference. Otherwise, service performance will degrade and ultimately drop calls. Time synchronization establishes a baseline for events critical to planning, engineering and operations maintenance of the MBB network. Therefore, timing and synchronization is critical infrastructure for MBB networks.

5G service offers bandwidth as much as 100 times greater than was available with 4G service. Some implementations require densifying coverage areas with many more cell sites than were typical of coverage areas with previous technology. Higher performance standards and new use cases beyond

traditional mobile broadband applications will also require many new cell sites in addition to the existing towers. All these cell sites must be synchronized, which presents a significant challenge to network operators.

Present Mode of Operation and Customer Challenges

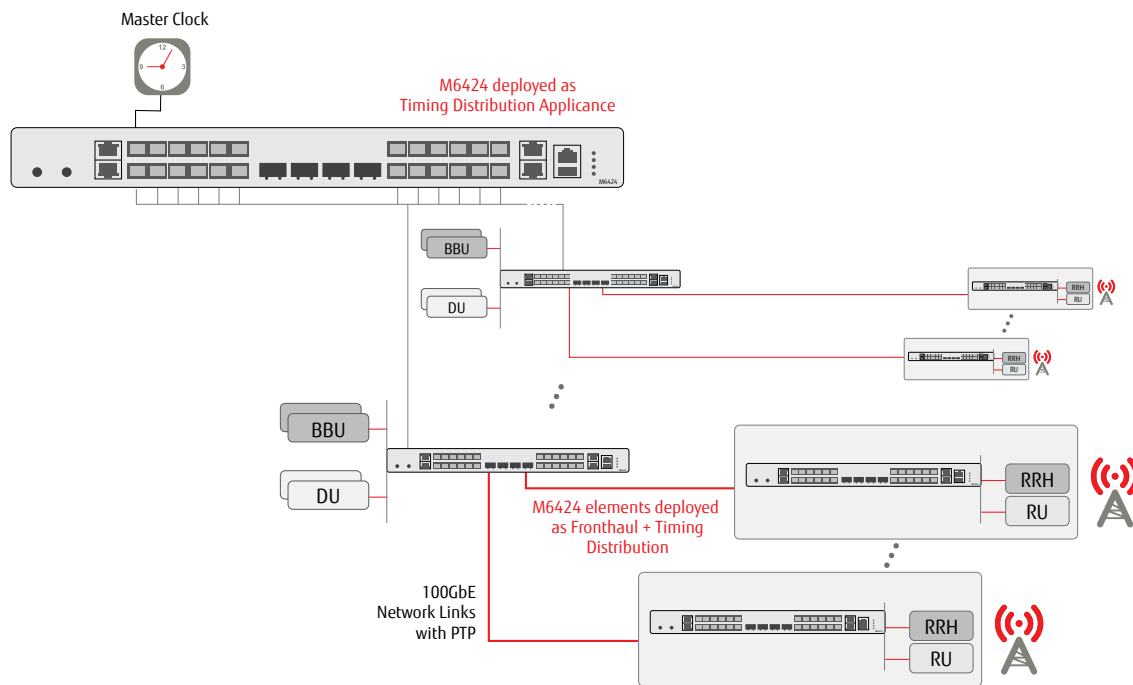
To maintain network synchronization, current wireless technology relies on global navigation satellite systems (GNSS) as the timing source within the ITU-T primary reference time clock (PRTC). The PRTC is deployed locally at cell sites and as a backup distributed through a packet network using IEEE 1588 precision time protocol (PTP). Network operators are moving away from GNSS owing to the effects of weather conditions and even nefarious elements. The direction is to ITU-T standard G.8272.1 called enhanced PRTC (ePRTC).

In ePRTC, the time source is generated locally from one or two highly accurate cesium clocks that are initially aligned and calibrated to the GNSS time reference. The challenge to the service provider is that, when evolving the network from PRTC to ePRTC, many cell sites and central office hub locations that had local GNSS PRTC will be replaced with a connection to the ePRTC. This connection will require a high number fanout of physical interfaces to legacy and new 5G RAN equipment.

An Economical Centralized Timing and Synchronization Solution

The temperature-hardened M6424 platform complements the evolution from distributed to centralized timing and synchronization (T&S) architecture with an economical, compact solution that reduces cost in comparison to traditional appliances. In addition, its dual functionality of timing distribution appliance and xHaul platform simplifies planning, engineering, and operations. Overall, the

Cost-Effective, Best-of-Breed Timing and Synchronization



flexiHaul M6424 TSN switch deployed as a timing distribution appliance and as a fronthaul platform with timing distribution

M6424 platform enhances customer experience on 5G networks with top performance and availability, while reducing service delivery cost.

Lower cost, Higher Fanout Density

As a timing distribution platform, the M6424 reduces the cost of fanout to local RAN elements by over 30% in comparison to PRTC/ePRTC appliances. The platform also features an efficient 1RU footprint with 35% more fanout ports than typical appliances.

Carrier-Class Precision Time Protocol

The M6424 offers standards-compliant, carrier-class timing distribution via ITU G.8275.1 PTP using IEEE 1588v2 boundary clock operation and ITU G.8273.2 class C/D performance.

Management

The M6424 is fully managed using the HSN8800 GUI-based element management system. The platform also provides management access via local craft port, in addition to Netconf/YANG, and SNMP traps for

remote visibility and northbound orchestration and control, ensuring operational integrity and integration within the 5G network.

Dual-Function M6424 Solution

In addition to the economies realized from timing distribution, service providers who also use the M6424 platform to deliver TSN xHaul for 4G CPRI, 5G eCPRI and Ethernet services will reduce costs for planning, engineering and operation. Training, sparring and supply chain costs are a few examples of where these economies are realized.

Operational Excellence through Open, Standards-Based Network Technology

Fujitsu has been a trusted partner in optical networking for over 30 years. Our solutions offer operational excellence through open networking, standards-based operation, and simplicity through automation. The flexiHaul M6424 TSN Switch is a best-of-breed platform for timing distribution and for multiservice RAN xHaul.

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