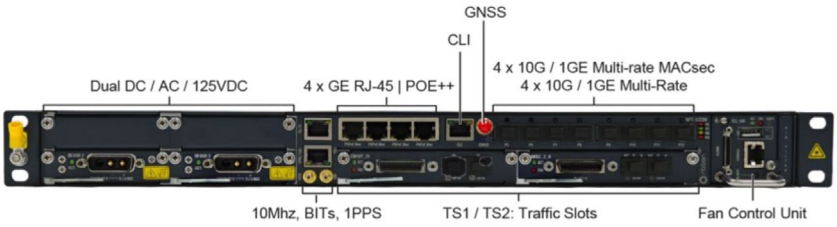
NPT 1022M

IP Access Router for Mission Critical Utility Networks

Ribbon's IP Solutions Overview

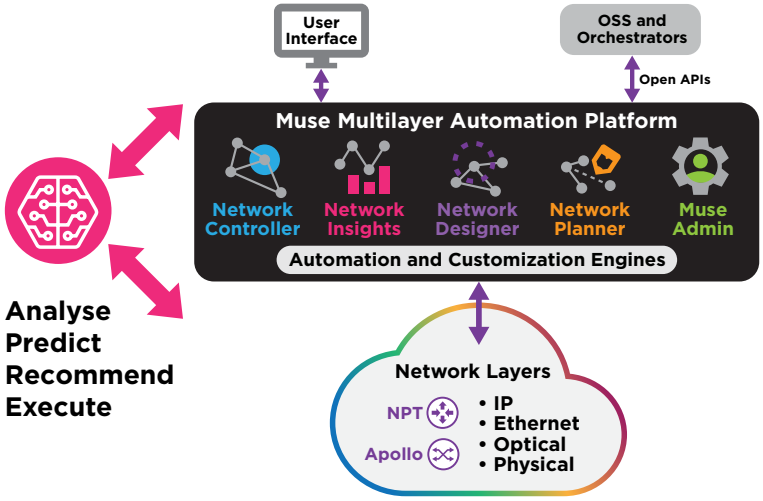
Ribbon's IP routing and packet transport strategy is built on two core principles: openness and automation. Ribbon's NPT IP routing and packet transport platforms separate the data plane from the control plane, enabling flexible design choices and allowing operators to tailor NPT solutions to meet their specific network and service requirements.



Ribbon's MUSE Multilayer Automation Platform (Muse MAP) is a fundamental building block for all of Ribbon's IP routing, packet transport and optical networking solutions. It delivers the advanced automation, analytics, and multilayer visibility required for operating a modern network with capabilities which extend far beyond a traditional network management system. By seamlessly integrating IP routing, packet transport and optical networking into a unified resource pool, Muse MAP simplifies operations while improving efficiency and service assurance. The Muse MAP platform consists of modular application blocks: Network Controller, Network Insights, Network Designer, Network Integrator, Network Planner, Automation Tools, Synchronization, and an AI Agent.

As part of its strategy, Ribbon IP routing and packet transport portfolio supports mission-critical IP access networks, addressing the unique operational, environmental, and deterministic demands of sectors such as power, railways, gas, defence, and other mission critical networks. Ribbon delivers tailored solutions specifically designed for mission-critical customers, with deployments spanning hundreds of operators across the globe. The NPT 1022M combines packet transport, TDM, data communications, security, and timing functions within a compact 1Ru modular form factor, providing a comprehensive and efficient platform for demanding network environments.

Muse MAP equips operators of mission-critical networks with robust capabilities to ensure an always-on, never fail communications infrastructure. The platform offers a suite of advanced automation tools alongside manual controls, enabling operators to achieve the optimal balance between automated and hands-on management to suit their operational requirements. This comprehensive lifecycle management covers both legacy and modern services and applications and provides right-first-time provisioning, sophisticated network performance analytics, and rapid, accurate fault detection and recovery—essential for maintaining uninterrupted network performance and reliability.



Automation

Tools

- IP and Optical as single service layer
- Workflows
- Templates
- Network Planner
- AI troubleshooting Assistant

Customer Benefit

- Fast to the market
- Minimize churn
- Predict prior to action

Openness (L0-L3)

Offer

- Focus On IPoDWDM
- Open IP architecture
- Open and Modular:
  - Optical Separate OLS & OT
- Pluggable as product

Customer Benefit

- Flexibility in selecting solutions
- Multi-vendor is real
- MOFN as services

NPT 1022M Overview

The NPT 1022M is a compact, ruggedised, temperature-hardened access router purpose-built to help operators modernize their networks without compromising the performance and reliability of business-critical and mission-critical services. By providing a comprehensive set of routing, transport, and service interface capabilities in a compact 1RU platform, it supports service evolution, simplifies operations, reduces footprint and operational risk, and enables deterministic, always-on communications while also providing a practical path for TDM modernization.

The platform supports both routed and deterministic packet aggregation making is well suited to utility access applications with strict space, power and deterministic performance requirements, such as substation gateway deployments, where service and transport requirements will evolve over time. With Circuit Emulation Services used to support legacy services alongside modern packet-based services, the NPT 1022M allows utilities to maintain mission-critical TDM-based OT applications such as SCADA and teleprotection during a phased network modernisation.

Key Benefits

- Complete utilities access solution in a compact 1RU form factor
- Converged packet + legacy services to simplify substation architectures
- Efficient TDM-to-IP migration with integrated grooming and CES use cases
- Deterministic transport options for mission-critical applications
- Advanced timing and synchronization for WAN-to-substation distribution

Platform Capabilities

- 1RU hardened chassis for ETSI, 19" and 23" racks
- 120G system throughput with up to 92G port fan-out
- Flexible and redundant power supply architecture of 125VDC, -48V DC, and AC
- Dual Traffic Slot (T-Slot) architecture providing 2 T-slots for interface flexibility
- Ethernet Port fan-out
  - 8 x 10G/GE with MACsec capabilities
  - 4 x GE POE++
  - 8 x GE over the Traffic Slots
- Concurrent support for packet, TDM, and datacom services
- Native support for SCADA, teleprotection, and circuit emulation (CES) applications
- Operational temperature range: –40°C to +65°C
- Redundant power supplies and extractable fan unit

Why the NPT 1022M Matters for Utility Access Networks

Utility networks are adding new Ethernet/IP services while continuing to support traditional TDM services. This creates a need for a compact, reliable multiservice platform.

The NPT 1022M delivers this reliable multi-service platform by integrating the required interfaces into a single 1RU platform, helping reduce rack space, lower power consumption, simplify deployment, and cut overall solution cost.

EM10T_DI DataCom Interface Card

The EM10T_DI is a T-slot service card that enables the NPT 1022M to deliver a complete utilities access solution within a single 1RU platform, eliminating the need to deploy extra equipment to support legacy datacom and TDM interfaces.

The card integrates key utility interfaces, including IEEE C37.94 for teleprotection and V.24 / V.35 datacom interfaces, while supporting flexible operational profiles to address a wide range of substation applications.

In addition, the EM10T_DI provides DS0-level grooming capabilities, supporting up to 16 E1/T1 circuits with up to 1178 DS0 cross-connects. This enables efficient aggregation and transport of TDM services over IP and facilitates a smooth migration from legacy TDM networks to packet-based infrastructure.

Each EM10T_DI card supports two IEEE C37.94 interfaces and one SCSI36 connector for datacom connectivity. With support for up to two cards in the NPT 1022M, the platform maximizes interface density in a compact 1RU system.

Timing and Synchronization Capabilities

The NPT 1022M provides a comprehensive timing and synchronization architecture optimized for utility substation environments, where precise and reliable timing is critical. It supports multiple timing interfaces, including BITS, 10 MHz, 1PPS, Time of Day (ToD), and an integrated GNSS receiver.

The platform supports Synchronous Ethernet (SyncE) based on ITU-T G.8262, enabling high-accuracy frequency synchronization at the physical layer, independent of packet conditions.

It also supports hybrid timing mode, distributing SyncE (frequency) and IEEE 1588v2 (phase and time) simultaneously over the same interfaces to enhance synchronization accuracy and ensure deterministic timing performance.

The NPT 1022M supports both Telecom Profile and Power Utility Profile, enabling deployment across mixed network environments:

- Telecom Profile
  - G.8273.2 Class C accuracy encrypted and un-encrypted
  - IEEE 1588v2 G.8275.1 (full timing support) and G.8275.2 (partial timing support)
- Power Utility Profile
  - IEC/IEEE 61850 9 3:2016 (PUP)
  - IEEE C37.238 2017
- Interworking - Telecom and Power Profiles
  - Seamless timing distribution between WAN (Telecom profile) and intra substation networks (Power profile)

All NPT 1022M interfaces, 10GE and GE support both IEEE 1588v2 and SyncE, enabling delivery of frequency, phase, and time across the network.

Ribbon's IP rNOS Provides Flexible Routing and Transport Software Capabilities

The NPT 1022M leverages Ribbon's network operating system (IP rNOS) to provide a flexible routing and transport software stack. The Ribbon IP rNOS supports a wide array of routing and transport protocols, including native Ethernet, MPLS-TP, IP/MPLS, RSVP-TE, LDP and Segment Routing. By enabling multiple protocol stacks to operate concurrently within a unified system, operators are empowered with the flexibility to select the optimal protocol for their specific operational requirements. Furthermore, the system facilitates seamless and uninterrupted protocol upgrades, allowing networks to evolve smoothly as demands change, without service disruption. With this flexibility, utility network operators can select the deterministic and routed packet transport protocols they require to support their operational and business requirements.

IP/MPLS Transport

For operators wanting a fully routed network, IP/MPLS including RSVP-TE, LDP, and Segment Routing would be the approach of choice, enabling advanced traffic engineering, fast convergence, and multi-service support for service provider and mixed utility environments.

MPLS-TP Transport

For operators wanting SDH/SONET like operational behaviour, MPLS-TP is the protocol of choice. MPLS-TP was designed for deterministic and tightly controlled network environments, it offers centralized management with separation between the control plane and the data plane and provides predictable traffic flows, SDH/SONET compliant protection switching, and guaranteed path symmetry between working and protection paths.

Native Ethernet (L2) Transport

Native Ethernet support can be used for Layer-2 service delivery and simplified access/aggregation deployments.

Multistack MPLS

Multi-stack MPLS allows operators to have combination of approaches in their network and provides them the flexibility to migrate between the approaches as operational demands change.

Circuit Emulation (CES) Capabilities

Ribbon offers extensive industry-leading circuit emulation capabilities, supported by robust management systems, proven processes, and deep experience in assisting mission-critical and service provider customers with the migration of legacy services from SDH/SONET transport networks to modern packet transport infrastructures.

Our best-in-class circuit emulation capabilities, together with support for deterministic packet transport and hardened operational management, provide mission-critical network operators with a secure and reliable pathway for migrating legacy services onto packet-based networks. This flexible migration strategy enables operators to transition at their own pace and select the transport protocol that best suits their operational requirements, ensuring continuity and minimising risk throughout the process.

Utilities Standards and Compliance

The NPT 1022M platform has been engineered to meet the rigorous standards and operational requirements demanded by utility networks, ensuring robust performance and reliability in challenging environments. Below are key standards relevant to NPT 1022M deployments:

Environmental and Substation Compliance

- ETSI EN 300 386 V2.2.1:2022
- FTZ 1TR9:2023 Ed.6
- EN55035:2017/A11:2020
- EN55032:2015/A11:2020
- CISPR32:2015/A1:2019
- AS/NZS CISPR32:2015
- IEC 61850-3:2013
- IEC 62236-4:2018
- IEEE 1613:2023
- EN 50121-4:2016/A1:2019
- VCCI-CISPR 32:2016
- FCC CFR 47 Part 15 Subpart B Class A
- ANSI C63.4:2014 / ICES-003:2020 (Issue 7)

Timing and Synchronization

- SyncE: ITU-T G.8262 (Synchronous Ethernet Equipment Clock)
- IEEE 1588v2 – Precision Time Protocol
- ITU-T G.8275.1 / G.8275.2 / G.8273.2 Class C
- IEC/IEEE 61850-9-3 – Power Utility Profile
- IEEE C37.238 2017 - IEEE 1588 Precision Time Protocol in Power System Applications

Interfaces and Protocols

- IEEE C37.94 – Optical teleprotection interfaces
- IEEE 802.1AE – MACsec
- IEEE 802.1X – MACsec Key Agreement (MKA)
- IEEE 802.1AEbn / IEEE 802.1AEbw – AES-256 and extended packet numbering
- ISO/IEC/IEEE 8802-1AE

Conclusion

The NPT 1022M delivers a compact, converged, and deterministic access router for utility networks. By combining packet, TDM, datacom, security, advanced timing, and flexible transport capabilities within a single 1RU platform, it enables efficient deployment while meeting the stringent requirements of mission critical utility infrastructures.

Contact Us Contact us to learn more about Ribbon solutions.