Asset Management Plan

Telecommunications Network Management Systems (TNMS)

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Authorisations

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Review cycle	2.5 Years	

Responsibilities

This document is the responsibility of the Metering and Asset Strategy Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").

The approval of this document is the responsibility of the General Manager, Strategic Asset Management.

Please contact the Metering and Asset Strategy Leader with any queries or suggestions.

- Implementation   All TasNetworks staff and contractors.

- Compliance   All group managers.

Record of revisions

Section number	Details

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Glossary of Terms

ACMA	Australian Communications and Media Authority
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
CAPEX	Capital Expenditure
DNS	Domain Name System
DWDM	Dense Wave Division Multiplexing
E2E	End-to-End
ERP	Enterprise Resource Planning
FCAPS	ITU-T Management Framework which consists of Fault Management, Configuration Management, Accounting, Performance, and Security
GIS	Geographic Information Systems
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IT	Information Technology
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
LAN	Local Area Network
MPLS	Multiple Protocol Layer Switching
NER	National Electricity Rules
NMS	Network Management System
OPEX	Operational Expenditure
OS	Operating System
OSI	Open Systems Interconnection
OSI Model	An international layered model for the interconnection of information technology and/or telecommunication based networks and devices
PABX	Private Automatic Branch Exchange
PLC (1)	Programmable Logic Controller
PLC (2)	Power Line Carrier
R19	Regulatory Submission Period from financial years 2019 to 2024
REPEX	Replacement Expenditure
RF	Radio Frequency
SAP	System Applications Products
SAN	Storage Area Network
SCADA	Supervisory Control and Data Acquisition
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol, the suite of protocols that govern the Internet and Internet based networks
TDM	Time Division Multiplexing
TESI	Tasmanian Electricity Supply Industry
TIMS	Telephone Information Management Systems
TMR	Trunk Mobile Radio
TOTEX	Total Expenditure which is equal to Capital Expenditure + Operational Expediture
VoIP	Voice over Internet Protocol

WAN   Wide Area Network

WDM   Wave Division Multiplexing

Wi-Fi   An acronym to describe IEEE 802.11 standard based wireless networks

WLAN   Wireless Local Area Network

1 Purpose

The purpose of this document is to describe the management of Telecommunications Network Management Systems and related assets:

- TasNetworks' approach to asset management, as reflected through its legislative and regulatory obligations and strategic plans
- The key projects and programs underpinning its activities
- Forecast CAPEX and OPEX, including the basis upon which these forecasts are derived

2 Scope

2.1 Inclusions

The scope of this Asset Management Plan document includes, but is not limited to, the following prescribed telecommunications assets:

- Software applications used to monitor, configure and maintain telecommunications equipment, such as switches, routers, multiplexers, microwave radio links, DC power systems and telecommunication site environmental monitoring.
- Software applications used to control access to the telecommunications equipment
- Software applications used to monitor and track voice call data and configure Trunk Mobile Radio (TMR) terminals

2.2 Exclusions

The scope of this Asset Management Plan document excludes:

- Non-Prescribed telecommunications assets and systems
- Prescribed assets covered under other Telecommunications portfolio asset management plans
- Transmission and distribution electricity network operational and management systems
- Transmission and distribution electricity network Supervisory Control and Data Acquisition systems
- Virtual and/or physical servers and associated storage access networks (SAN).
- Operating systems and associated supporting software such as anti-virus, patch-management, DNS and Windows Active Directory Services
- Corporate and Administrative Information Technology systems and assets managed by the Information Technology group

3 Strategic Alignment and Objectives

This asset management plan has been developed to align with both TasNetworks' Asset Management Policy and Strategic Objectives. This management plan describes the asset management strategies and programs developed to manage the telecommunications network management systems, with the aim of achieving these objectives.

3.1 Overall business objectives

For these assets the management strategy focuses on the following objectives:

- Safety will continue to be our top priority and we will continue to ensure that our safety performance continues to improve
- Service performance will be maintained at current overall network service levels, whilst service to poorly performing reliability communities will be improved to meet regulatory requirements
- Cost performance will be improved through prioritisation and efficiency improvements that enable us provide predictable and lowest sustainable pricing to our customers
- Customer engagement will be improved to ensure that we understand customer needs, and incorporate these into our decision making to maximise value to them
- Our program of work will be developed and delivered on time and within budget

3.2 Strategic asset management objectives

- Present an overview of the telecommunications management systems asset populations;
- Manage business risk presented by the assets to within acceptable limits;
- Achieve reliable asset performance consistent with prescribed service standards;
- Assess the risks specific to the assets and identify corresponding risk mitigation strategies;
- Ensure the effective and consistent management and coordination of asset management activities relating to the assets throughout their life-cycle;
- Ensure our team members are trained, authorised and competent to undertake their work activities;
- Demonstrate that the assets are being managed prudently throughout their life-cycle;
- Ensure asset management issues and strategies, as they relate to the assets, are taken into account in decision making and planning; and
- Define future operational and capital expenditure requirements of the assets.

4 Asset Information Systems

4.1 Systems

Prescribed telecommunications asset data and information is currently stored and managed using the following systems and methods:

- Autodesk AutoCAD and Microsoft Visio drawings stored within the Information Management systems. Each telecommunication site has a detailed set of drawings including:
  - o site drawings
  - o building drawings
  - o rack layout drawings
  - o schematic diagrams
  - o wiring diagrams
  - o manufacturer drawings
- Excel Spreadsheets for information such as krone termination details
- Network Management System software as detailed in section 5
- Geographic Information System (GIS) used for fibre optic cable management

- The Australian Communications and Media Authority (ACMA) radio frequency (RF) database and associated RF Hazard folders
- A Microsoft Access database that is scheduled to be replaced by a SAP based ERP system in 2018

4.2   Asset Information

The asset data for TasNetworks' Network Management Systems Assets has been well documented and detailed using the current Asset Information systems TasNetworks' has in place.

5   Description of the Assets

5.1   Core functions

The Telecommunications network management systems allow TasNetworks to operate and monitor its Telecommunications Network as defined under the ITU-T telecommunication network management standard FCAPS framework. Its functions include:

- **Fault Management (F)**
    - o   Collection, logging, display and analysis of network events and alarms
    - o   Forwarding of events to remote staff via SMS, email or voice auto-diallers
- **Configuration Management (C)**
    - o   Remote configuration of network equipment
    - o   Backup of network equipment configuration, change tracking and configuration compliance
    - o   Provisioning and modification of network services
- **Accounting (A)**
    - o   Inventory and asset reporting of network equipment
    - o   Voice call and network usage statistics and reporting
- **Performance (P)**
    - o   Retrieval and storage of network performance data such as utilisation, packet loss, jitter and latency and error rates
    - o   Alerting of performance threshold violations
- **Security (S)**
    - o   User access, authentication and accounting for network management system users and user groups

5.2   Telecommunications Management System Categories

The Telecommunications Management Systems are classified in the following broad categories:

- Manager of Manager or Umbrella event management systems;
- Management for Simple Network Management Protocol (SNMP) equipment
- Network Configuration Management systems
- Management of Optical Transport and Time Division Multiplexing (TDM) based network elements;
- Management of specialist Microwave radio equipment
- Management of Programmable Logic Controllers (PLC) equipment
- Management of MPLS based equipment.
- Management of Telephony/Voice Systems; and
- Trunk Mobile Radio (TMR) terminal management.
- Other Diagnostic and Management Systems

A explanation of these categories is provided in the following section.

5.2.1   Manager of Manager or Umbrella event management systems

The Manager or Managers provides collection and consolidation of events, alarms and system status of telecommunications assets. The systems provide integration to other NMS applications for event collection and the forwarding or events for after-hours notification.

The current application is IBM Netcool Operations Insight.

5.2.2   Management of Simple Network Management Protocol (SNMP) equipment

These systems provide performance management and monitoring of all generic Simple Network Management Protocol (SNMP) based equipment.

The current application is Castlerock SNMPc Network Manager.

5.2.3   Network Configuration Management systems

This system provides the automated configuration backup, real-time change control and configuration change tracking of all CLI (Command Line Interface) based equipment.

The current system is Solarwinds Orion NCM.

5.2.4   Management of Optical Transport and Time Division Multiplexing (TDM) based network elements

These systems provide management and monitoring functions of all optical transport, DWDM and TDM equipment. In addition to the standard FCAPS functions, the sytem provides network topology and service management.

The current applications are Coriant TNMS and Nokia Access Integrator.

5.2.5 Management of specialist Microwave radio equipment

This system provides management and monitoring function for specialist NEC Microwave radio equipment.

The current application is NEC PNMSJ.

5.2.6 Management of Programmable Logic Controllers (PLC) equipment

These systems are used to configure and display alarm status information from all TasNetworks' telecommunications PLC equipment.

The current applications are Siemens WinCC, Step 7 and Matrikon OPC server.

5.2.7 Management of Multiple Protocol Layered Switching (MPLS) based equipment

In addition to the standards FCAPS functions, this system provides specific MPLS based network functions such as:

- network discovery
- protocol and service analysis
- performance testing and reporting
- and network integrity checks

The current application is WANDL IP/MPLSView.

5.2.8 Management of Telephony/Voice Systems

Telephone Information Management Systems (TIMS) provides call logging, and voice system performance management for Time Division Multiplexed and Internet Protocol based Private Automated Branch Exchange (PABX) systems. It is required to actively manage voice system performance.

5.2.9 Trunk Mobile Radio (TMR) terminal management

This system provides radio terminal profile configuration management. The Trunk Moibile Radio profiles are managed by TasNetworks as overlay services for the Tasmanian Electricity Supply Industry (TESI) Trunk Mobile Radio fleet.

TasNetworks currently owns its own Trunk Mobile Radio Handsets.

This management system will be replaced by TasNetworks when the Trunk Mobile Radio system has been decommissioned and replaced in the R19 period by the Tasmanian Government.

5.2.10 Other Diagnostic and Management Systems

These systems and software are other utilities that are used to manage the telecommunications network and equipment such as Secure Services Host clients, File Transfer Protocol clients, Authentication servers, Remote Access Software and other tools.

5.3   Licenses and Support Agreements

The current licences and support agreements are listed in Table 1.

Table 1 - Software licences and support agreements

Manufacturer	Model	Operating System	License Agreement	Open/Closed source	Licence Type	Length of agreement	Licence Count
Castle Rock Computing	SNMPc Network Manager	Windows 2008/2012	Supported	Closed	server	01/06/2018	2
Coriant	TNMS	Windows 2008/2012	Supported	Closed	server	01/04/2018	1
IBM	Netcool Operations Insight	Redhat 6	Supported	Closed	network device	01/06/2018	1630
Juniper Networks	WANDL IP/MPLSView	Centos 6	Supported	Closed	network device	01/06/2018	120
Matrikon	OPC Server	Windows 2008/2012	Supported	Closed	server	01/06/2018	1
NEC	PNMSJ	Windows 2008/2012	Supported	Closed	server	No end date	1
Nokia	Access Integrator - Domain Manager	Windows 2008	Unsupported	Closed	server	Not applicable	1
Radmin	Radmin Server	Windows 2008/2012	Supported	Closed	server	No end date	50
Siemens	WinCC	Windows 2008/2012	Supported	Closed	server	01/12/2017	1
Siemens	Step 7	Windows 2008/2012	Supported	Closed	server	No end date	1
Solarwinds	Orion NCM	Windows 2008/2012	Supported	Closed	network device	01/04/2018	500
XPerience Technologies	Clear Box TACACS+ RADIUS Server	Windows 2008/2012	Supported	Closed	server	No end date	1
Total number of licenses and support agreements							2309

6 Standard of Service

6.1 Technical Standards

The technical standards that are used by TasNetworks include, but are not limited to, the following Australian and/or international standards:

- International Telecommunication Union, ITU-T Telecommunication Standardization Sector of ITU, M.3400, SERIES M: TMN and network maintenance: International Transmission Systems, Telephone Circuits, Telegraphy, Facsimile and Leased Circuits, Telecommunications management network, TMN management functions

6.2 Performance Objectives

The Telecommunications Network Management System availability should align with the requirements of the operational telecommunications services and be available on a 24 hours a day x 7 days a week x 365.25 day a year basis. The availability should be such that network operations and maintenance staff can perform the normal duties to ensure the network is maintainable against prescribed service levels.

6.3 Key Performance Indicators

The Telecommunications Network Management System software availably target is 99.9% uptime.

7 Associated Risk

7.1 Risk Management Framework

TasNetworks has developed a Risk Management Framework for the purposes of assessing and managing its business risks, and for ensuring a consistent and structured approach for the management of risk is applied.

An assessment of the risks associated with the Telecommunications Network Management Systems has been undertaken in accordance with the Risk Management Framework. For each asset in this class the assessments have been made based on:

- Condition of Telecommunications Network Management Systems in service across the network
- Criticality of Telecommunications Network Management Systems and associated assets
- Probability of failure (not meeting business requirement)
- Consequence of failure
- Performance
- Regulatory compliance
- Safety risk
- Environmental risk
- Customer

Due to the level of risk identified in some of the assessment criteria, a requirement to actively manage these risks has been identified.

The proposed programs of work in this Asset Management Plan will manage the risks to TasNetworks at an acceptable level in accordance with the TasNetworks' Risk Management Framework. An overall risk matrix for the Telecommunications Network Management Systems program of work is detailed in the following section.

7.2 Risk Matrix for the proposed program of work and assets

Table 2 - Telecommunications Network Management Systems Assets Risk Matrix

Risk Category	Risk	Likelihood	Consequence	Untreated Risk Rating	Residual Risk Rating
Customer	Not addressing poor asset performance will likely result in telecommunications system outages which may result in subsequent power system compliance issues. This results in poor service to connected customers.	Unlikely	Moderate	Medium	Low
Environment and Community	There is unlikely to be any significant risk to the environment and community.	Rare	Negligible	Low	Low
Financial	There is a minor risk to TasNetworks' financial position.	Unlikely	Minor	Low	Low
Network Performance	Poor condition assets due to lack of vendor support adds increased risk of non-compliance of prescribed services and increase risk of outages. The lack of vendor support and software/firmware patching risks cybersecurity issues and unpatched vulnerabilities. Lack of vendor technical support may limit operational support staff ability to diagnose and troubleshoot faults. Failed communications may cause SCADA and protection systems to not operate as intended affecting effective control of the power system. Lack of management systems support will prevent operations staff from monitoring and managing the telecommunications assets. Protection systems that rely on the telecommunications network may not operate correctly compromising the clearance of faults and power system stability.	Possible	Moderate	Medium	Low
Regulatory Compliance	Non-compliance with National Electricity Rules. A decline in network availability affects the ability of TasNetworks to maintain compliance with	Possible	Moderate	Medium	Low

Risk Category	Risk	Likelihood	Consequence	Untreated Risk Rating	Residual Risk Rating
	the National Electricity Rules. Not having operational voice recording capabilities, logging and timestamping capability will cause a non-compliance with the National Electricity Rules. Risk of non-compliance with current Telecommunications Acts/Codes/Standards due to poor asset management and increase telecommunications network downtime.				
Reputation	There is unlikely to be any significant risk to TasNetworks' reputation.	Rare	Negligible	Low	Low
Safety and People	There are unlikely to be any significant safety or people risks.	Rare	Negligible	Low	Low

7.3   Risk Management for unsupported network management systems

There are network management systems being used for telecommunications hardware assets that are still in the TasNetworks' asset portfolio that are no longer supported. This is due, but not limited to, the following circumstances.

- The manufacturers/vendors are no longer in business or have changed to new owners/amalgamated.
- The new/alternative platforms do not communicate with older hardware in the asset portfolio.
- The hardware assets are still within their useful economic life however the software is no longer being updated by the manufacturer.

The software security and reliability risks are managed by the following operational activities:

- Software is backed up periodically every 24 hours and can be rolled back to the last usable state as required.
- The telecommunications network management systems are segregated with multiple zone firewalls and access to these systems are tightly controlled.

Until the telecommunications hardware is upgraded, decommissioned or replaced, TasNetworks' will continue to manage these risks to acceptable levels as per the risk management framework.

8 Management Plan

8.1 Historical

Previously, the Telecommunications Network Management Systems were combined with the Transmission and Distribution Network Operational and Control systems asset management plans.

In future, the Telecommunications Network Management Systems will be covered under its own Asset Management Plan.

8.2 Strategy

The strategy to manage the Telecommunications Network Management Systems assets is designed to align with software licence agreement and support agreement of the systems.

The products and systems used to implement the Telecommunications Network Management Systems have life cycles and support cycles similar to Information Technology software assets.

The typical length of support/licence agreements of these products is approximately 3 years.

To align with the vendor/manufacturer release schedules, this asset management plan proposes 3-yearly cyclic capital upgrades/replacements of Telecommunications Network Management Systems.

This strategy will manage the risks to TasNetworks' business operations and ensure that the Telecommunications Network is managed with supported products and systems.

This strategy will also ensure that the Telecommunications Network Management Systems will have the capacity to cater for future growth in the prescribed telecommunications network asset and customer base.

8.2.1 Preventative Maintenance

The preventative maintenance performed on Telecommunications Network Management Systems is heavily Information Technology based and consists of:

- Applying software patches and updates
- Backup routines of systems and operational data
- Updating device drivers and firmware when required
- Managing access controls and permissions
- Protection against cybersecurity risks such as malicious software, sabotage and intrusion
- Routine testing to ensure correct operations
- Maintaining physical server hardware if required
- Maintaining virtual servers/machines if required

The preventative maintenance practices are designed to manage risks to the Telecommunications Network Management Systems in between major capital upgrades and to keep the TasNetworks' Telecommunications running to the required levels of service.

8.2.2 Corrective Maintenance

The corrective maintenance of the Telecommunications Network Management Systems is recovery from failures or a cybersecurity breach by repairing defective hardware, firmware, and

software and restoring the Telecommunications Network Management Systems to an acceptable operational state.

These incidents and faults vary in severity from minor faults to complete system failures.

The Telecommunications Network Management Systems are critical to the TasNetworks' Telecommunications Network operating correctly and corrective maintenance operations should be kept to a minimum.

8.2.3 Preventative Maintenance versus Corrective Maintenance

Failures of the Telecommunications Network Management Systems may cause Telecommunications outages of severely limit TasNetworks' ability to respond to Telecommunications faults and outages at TasNetworks' Telecommunications Sites. This would cause TasNetworks to be non-compliant with the National Electricity Rules for both the requirements of the Telecommunications Network and power system security.

Preventing non-routine maintenance operations is critical to maintaining the required level of Telecommunication services and to remain compliant with the National Electricity Rules.

8.2.4 Planned Asset Replacement versus Reactive Asset Replacement

To address the compliance and performance requirements for prescribed telecommunications services a reactive replacement strategy for Telecommunications Network Management Systems is not an acceptable option.

Reactive replacement of Telecommunications Network Management Systems will cause disruption to the prescribed Telecommunications services and potentially impact power system security and the ability of TasNetworks to participate in the National Electricity Market.

8.2.5 Non Network Solutions

There are no Non Network Solutions to manage this asset class.

8.2.6 Network Augmentation Impacts

TasNetworks' requirements for developing the power transmission and distribution system, and the telecommunications network that supports them, are principally driven by these elements:

- Demand forecasts
- New customer connection requests
- New generation requests
- Network performance requirements
- National electricity rules (NER) compliance
- New applications for prescribed telecommunications services to support the transmission and distribution networks

Augmentation and modification of the transmission and distribution electricity networks will place greater future demand on the prescribed telecommunications network. This is due to new technologies in protection, control and metering of the power system and advanced data acquisition applications which use telecommunications systems to transfer data, information and signals. These modern systems need a reliable, compliant and secure telecommunications network to operate correctly and remain compliant with the National Electricity Rules.

8.2.7 Regulatory Obligations

The requirements of the Telecommunications Networks participating under the National Electricity Market are subject to, but are not limited to, the following sections of the National Electricity Rules:

- Section 4.11 Power System Security Support
- Schedule 5.1.2.1 Credible contingency events clause (d)
- Schedule S5.1.9 Protection systems and fault clearance times clause (d)

The telecommunications bearer network must also satisfy the requirements of the AEMO (Australian Energy Market Operator) Standard for Power System Data Communications (Version 1.2 Final).

The management platforms the Telecommunications Network Management System uses to manage the telecommunications networks are critical to meeting the requirements under the National Electricity Rules.

The management platforms also provide the facilities for timestamping and recording power system operational communications as per the requirements of the National Electricity Rules.

Without up-to-date and supported telecommunications management systems, TasNetworks risks non-compliance with the National Electricity Rules and may not be able to continue to participate in the National Electricity Market (NEM).

8.2.8 Program Delivery

The needs assessment and options analysis for undertaking an asset management activity is documented in the Investment Evaluation Summary for that activity.

The delivery of these activities follows TasNetworks' end to end (E2E) works delivery process.

8.2.9 Disposal Plan

Telecommunications Management Systems which have been replaced shall be decommissioned and disabled in a secure manner.

8.3   Capital programs and projects

8.3.1 Replacements and upgrades

8.3.1.1 R19 01784 Telecommunications Management/Operational Systems - Telecommunications Network Management Systems enhancements/upgrade program

The objective of this program of work is to upgrade and install new management systems to maintain operational and monitoring capability for the TasNetworks' Telecommunications Network Management System.

This will be done on a 3 yearly cycle to align with the average software support periods and major release cycles by the software vendors.

8.4 Operational and maintenance programs

8.4.1 Routine maintenance programs

8.4.1.1 R19 02281 Telecommunications Management/Operational Systems - Telecommunications Network Management Systems Preventative OPEX Program

This program of work encompasses the routine maintenance, patching and configuration of the Telecommunications Network Management Systems. This program ensures the Telecommunications Network Management systems are maintained and operated to acceptable and compliant levels of service.

8.4.2 Non-Routine maintenance programs

8.4.2.1 R19 02282 Telecommunications Management/Operational Systems - Telecommunications Network Management Systems Corrective OPEX Program

This program of work is required to account for corrective works associated with the Telecommunications Network Management Systems such as system faults and corresponding repairs and replacements. This program is required to restore the Telecommunications Network Management Systems after faults and other non-routine events.

9 Summary of programs

An overall view of the programs of work described in this asset management plan, including volumes and financial information, is located in the following document:

Telecommunications Network Management Systems Asset Management Plan Program Summary, Record Number: R0000789876, http://reclink/R0000789876

10 Related Standards and Documentation

The following documents have been used to either in the development of this management plan, or provide supporting information to it:

1. Australian Energy Market Commission, National Electricity Rules (Current Rules), http://www.aemc.gov.au/Energy-Rules/National-electricity-rules/Current-Rules

2. Australian Energy Market Operator, AEMO - Final Determination - Standard for Power System Data Communications Version 1.2, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Network_Connections/Transmission-and-Distribution/AEMO-Standard-for-Power-System-Data-Communications.pdf

3. International Standards Organisation/International Electrotechnical Commission, ISO/IEC 10040:1998 Information technology -- Open Systems Interconnection -- System Management Overview, https://www.iso.org/standard/24406.html

4. Telecommunications Network Management Systems Asset Management Plan Program Summary, Record Number: R0000789876, http://reclink/R0000789876

5. TasNetworks Telecommunications CAPEX/OPEX Budget Long Term, R0000768704, http://reclink/R0000768704

6. TasNetworks Corporate Plan - Planning period: 2017-18 to 2021-22, R0000745475, http://reclink/R0000745475

7. TasNetworks Strategy on a page 2017-18, R0000764312, http://reclink/R0000764312

8. TasNetworks Business Plan 2017-18, R0000779008, http://reclink/R0000779008

9. TasNetworks Roadmap – 2025, https://www.tasnetworks.com.au/customer-engagement/submissions/

10. TasNetworks Zero Harm Policy, https://www.tasnetworks.com.au/about-us/policies/zero-harm/

11. International Telecommunication Union, ITU-T Telecommunication Standardization Sector of ITU, M.3400, SERIES M: TMN and network maintenance: International Transmission Systems, Telephone Circuits, Telegraphy, Facsimile and Leased Circuits, Telecommunications management network, TMN management functions, https://www.itu.int/rec/T-REC-M.3400-200002-I/en