

Application Note

Migration of SEEmiles to NMP

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Summary

Objective of this Application Note is to provide MSP1000 customers with guidance how to migrate from SEEmiles management software to MICROSENS NMP (Network Management Platform).

NMP offers advanced management features for MSP1000 hardware (previously called "TeraMiles") and serves as a unified interface connecting the network's optical transmission components seamlessly to the Ethernet components.

That is why the decision was taken to choose NMP as the comprehensive and future orientated Network Management System, on which we will focus our activities on.

This migration guide helps user get going by describing typical management tasks on the new platform and by indicating the structural differences of the two systems.

Glossary

Term	Description
IEEE	Institute of Electrical and Electronics Engineers, Inc. (www.ieee.org)
LAN	Local Area Network
LED	Light Emitting Diode
LMMP	LAN/MAN Management Protocol
MAC	Media Access Control
MAN	Metropolitan Area Network
NMS	Network Management System

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Typographical Conventions

The following typographical elements are used in this document:

Typographical Elements	Explanation
•	List element, 1 st order
◦	List element, 2 nd order
www.microsens.de	Hyperlink to a website or an e-mail address
Note:	A note tags an important fact
□	Work step
[... ...]	Choose one of the values offered, e.g. from [Disabled Enabled], choose Enabled.
Command	A string to enter in the Command Line Interface
	Work step(s) in the Command Line Interface (CLI)

Information available from the MICROSENS Website

Registered users can find current firmware versions as well as further information on our website:

- Registration: www.microsens.de > Partner-Login > Follow the link 'Please register here' > Fill in the [online registration form](#) and submit it
 - You will receive an email from MICROSENS with a user name and a password
- Login: www.microsens.de > Partner-Login > Enter user name and password > Press the 'Login' button
 - Firmware images: Navigate to your device and select the tab 'Services'
 - For further information select one of the other tabs

Note:

Make sure the browser allows scripts.

1 Definitions

Before we delve into the detail we should clarify the terminology and what is behind the name.

1.1 MSP1000

The MSP1000 is an optical access system mostly utilised as CWDM or DWDM system for data centre interconnection or for short to medium haul carrier access.

The MSP1000 is based on the TeraMile WavePilot and FiberPilot systems. In the context of this document MSP1000 also refers to the related TeraMile systems.

The NM3 is in fact intended to upgrade such a TeraMile system to the latest technology and at the same time to enable the systems to use NMP.

1.2 Generation 6 – G6

In 2013, MICROSENS introduced a new series of Ethernet switches. Internally, they are much more advanced than previous generations.

Main changes are:

- Use of Linux as underlying platform
- Data driven object model
- Use of common XML templates to define all features
- Use of automatic code generation based on the XML templates
- Use of an event system to relay information between tasks
- MICROSENS microScript language permits custom features

1.3 NM3

The NM3 is the name of the latest management module specifically designed to replace the previous NM1 and NM2 modules (NMS-4 and NMS-3 in TeraMile guise).

Basically, the NM3 is a combination of a MICROSENS G6 Ethernet Switch and the NM2 (NMS-3). This enables a host of new features that come through the use of the Generation 6 software architecture to be moved to the existing MSP1000 platform.

In fact, the NM3 may be used in almost every existing TeraMile system and thus serves to leverage these older systems to the latest in networking technology (see Appendix).

1.4 SEEmiles

SEEmiles was developed solely to support the MSP1000 optical devices. As such it is a little more specialised than its successor NMP. Thus, some existing features and GUI windows may be more precisely tailored to the need of a DWDM system than the recent NMP.

On the other hand, being focused only on MSP1000 is also its biggest drawback.

It has been decided to focus future R&D activities on the more general NMP and in return make more effort to further optimise NMP for the use with optical systems. Therefore the NM3 provides new features that are not configurable via SEEmiles.

1.5 NMP

NMP is the common management platform for all MICROSENS products.

NMP started its life as manager for many Ethernet switches. A key feature here is the ability to perform operations on 1000 units simultaneously.

In past years the software evolved to support the MSP1000 and MSP3000 series and some other non-Ethernet devices.

A recent addition that came with the Generation 6 devices is the automatic generation of GUI windows based on the XML defined feature set of the devices. This results in automatically adapted views that always match the actual feature set of the current device.

2 New Features

Based on the latest generation of a full featured Ethernet Layer 2 switch, the NM3 offers a great amount of features that are not usually found in management modules.

Note:

The use of these features requires setup directly in the NM3 module. As mentioned before this setup cannot be done via SEEmiles.

- SSH terminal console permits encrypted access and full control via scriptable command line interface
- Script language permits actions on any defined system condition
- Supports SNMPv1, SNMPv2c and SNMPv3
- Encapsulated "SEEmiles" traps as well as new G6 traps. (Note: new MIBs!)
- VLAN support: the NMS can be used in any VLAN.
- STP/RSTP/MSTP spanning tree protocols
- MICROSENS RING protocol: It is now possible to create an optical (or electrical) ring that consists of several NM3 modules. The optical ring may travel on any desired wavelength in the DWDM system. The ring can be closed, with no danger of looped packets. Such looping is avoided through the MICROSENS ring protocol.
- Access control via 802.1X (local or RADIUS based)
- SFP decoding and altering on optical power level fluctuations. This feature is also natively available in some transponder modules.
- LLDP may be used to identify the module within the Ethernet network.
- Automatic setting of time and date via NTP
- Fine-grained control of access rights down to the individual parameter. Depending on the operator's login privileges he/she will have access (read-only or read-write) to a specific set of parameters.
- Embedded web server with full feature support.

3 NMP vs. SEEmiles

With SEEmiles Professional, a number of advanced features is available. Many of these features have now been incorporated into the NM3 module itself or are part of NMP.

3.1 Report Generation

SEEmiles Professional provides the ability to view all software versions of all modules in one table or to compare the configurations side-by-side.

This feature now "naturally" comes with the NM3 as all data can be displayed in tables anyway.

3.2 Service View

A strong point of SEEmiles Professional is the ability to display a network in the scope of services. An end-to-end view of all elements that take part in the transmission of the data stream can easily be implemented.

This feature is not yet available under NMP but is planned to be incorporated.

4 SNMP

With the previous generations of NM1 and NM2 (NMS-4, NMS-3) modules, SNMP support was limited to SNMP v1.

For the NM3, full support of all SNMP standards (versions 1, 2c and 3) is provided. Furthermore, encrypted and authenticated traps can be generated.

The number of trap targets has been increased from 3 to 15. This also includes Syslog and human-readable trap output on a console port.

It is important to note that the new SNMP interface comes with all new MIBs and new objects (OIDs).

Even though full system support is available via SNMP, usually the standard MIB-II interface table is polled to see if a port is up or down.

The NM3 supports this and other standard MIBs.

Note:

The Port-IDs in the standard MIB have changed compared to the previous management modules. The new port scheme operates for the optical as well as the electrical ports.

5 Fundamental Differences

5.1 Communication Within a MSP1000 Shelf

The MSP1000 utilises an internal bus system whereby each plug-in module can talk to any other module within the shelf. A token bus protocol is used, which synchronises communication and ensures that each partner gets sufficient access time.

On the underlying bus protocol a higher level protocol, LMMP, is used which contains the actual information. This proprietary protocol uses a node-id, rack-id and slot-id plus the port position within the shelf for addressing.

The node-id, which declares the position in the world needs to be manually assigned. All other ids are provided directly by the hardware.

In the original scheme, up to eight shelves could be daisy-chained and managed through a single network management module.

The external management software on the PC, i.e. SEEmiles, would also use LMMP over TCP to take part in the communication between the modules.

All components of this management scheme would use LMMP and any module could talk directly to SEEmiles and vice versa. This is a powerful and elegant scheme.

However, when moving to the new XML based management scheme a lot of paradigms were changed to suit the new concept as well as to eliminate the drawback of the original scheme.

5.2 Only One Shelf per Network Management Module

- The original scheme enabled sharing of one module across up to eight shelves. This minimises hardware costs and leaves more slots for application modules in the shelves. However, time has proven that rarely more than one shelf is needed. And in the best case three shelves were sufficient.
- In order to be able to discover the local state of the fans and power supplies, an independent hardware instance is needed. In practical terms, this is a network management module.

In most practical cases one network management module per shelf was used anyway. In the G6 implementation it was decided that a single module will always match one shelf – no extension possible anymore. This also has many advantages on the user's behalf when it comes to the number of slots etc. to display at the same time.

5.3 Optional Legacy LMMP Access

SEEmiles used LMMP over TCP to access the devices. With the introduction of the NM3 and the G6 based system, this is no longer the case.

LMMP still is used between the modules of a shelf, but as soon as management information leaves the shelf, standard protocols are used. This permits use of more secure protocols such as SSH or SNMPv3.

Disable the legacy LMMP access for SEEmiles/NMP:

- `Device.MSP1000.disable_legacy_access = ENABLED`

Enable the legacy LMMP access for SEEmiles/NMP:

- `Device.MSP1000.disable_legacy_access = DISABLED`

5.4 Optional Legacy Node ID

The node ID was used to clearly identify a legacy device's location. It was manually assigned and had to be unique in the scope of the overall customer network.

With the move to the new MICROSENS G6 devices the concept of the node ID was dropped. Instead, an also unique IP address is used for the same purpose. That way, there is one less number to be concerned about.

Note:

The node ID is still used within the shelf, even in actual MICROSENS G6 devices. Since it is purely internal to the shelf, it no longer needs to be unique. In new deployment a changeable default node ID with "60000" is used. When used with existing installations, the NM3 automatically learns the existing node ID and uses it for subsequent internal traffic.

In network infrastructures with devices of different generations (legacy and state-of-the-art) the node ID has still to be used with the legacy devices.

5.5 Passwords

In the original scheme, passwords were located within the channel modules to be managed.

This had the advantage that each module could be secured with an individual password. The idea was that since a carrier might carry traffic from different customers on the same system an individual password could provide additional privacy.

A downside of this scheme was that the password was linked to the module. If a module was replaced, the password of the new module was different and needed to be redefined.

To circumvent this, a password server was implemented in the network management module which would set the password of the channel modules. This greatly simplified the password handling.

However, this scheme still had the disadvantage that only one password, but no login name was associated to the channel modules. This meant the device passwords were the same for any operator of the network management system. The potential problem was that the same password was known to any operator employee, and when an employee left, the password would have to be changed for security reasons. There was no concept of managing operator accounts in SEEmiles.

In the new scheme, a classic user/password scheme is used to log into the NM3 module, meaning that the access control is now solely on the NM3 module. The channel modules no longer perform the access protection and different users get different authentication data.

This simplifies user account management.

5.6 Configuration Storage

A classic MSP1000 feature is that every module carries its own complete configuration. Upon power up, the channel modules will boot up in a fraction of a second and will almost instantly be up and running. There is no time wasted waiting for an operating system to boot and also no interdependence on any other module. This is a great contribution to the very high availability of the overall system.

The fact that the configuration was (and still is) located on the module also means that when a module is exchanged for service or maintenance the configuration of the new module may be different and needed to be set manually to match the required configuration.

This proved to be a disadvantage, as manual intervention from someone trained was needed.

With the new G6 scheme, the configuration method was further advanced.

The modules still retain their local configuration and they still can boot up quickly and independently. However, when set to "master" mode, the new NM3 will compare the configuration of the module to the intended configuration. Usually, there will be no difference and nothing happens. Should a new module with different configuration be inserted, the NM3 detects these differences and automatically reconfigures the module to match the preset values.

Thus, it is possible to have untrained personnel to swap modules and there is no need to worry about the modules' respective configuration. Any mismatches will automatically be fixed immediately by the NM3.

6 PASSIVE vs. ACTIVE Operation Mode

Note:

Any special setting within the NM3 must be applied directly to the card, for example using a Telnet or SSH session.

```
□ Device.MSP1000.system_config.nms_operation_mode =  
  [PASSIVE|ACTIVE]
```

Basically, in "PASSIVE" mode the NM3 is designed to work as replacement of an NM1 or NM2 (NMS-4, NMS-3) module. In this mode it will relay the LMMP traffic from within the shelf via TCP to SEEmiles or NMP.

When the operation mode is set to "ACTIVE", the NM3 will actively monitor the configuration of any other module and force the configuration saved for the slot and type to the other modules.

SEEmiles will be informed about these changes as well and will adapt its databases accordingly.

Note:

This is the only feature of SEEmiles that will be available via the NM3. However, the additional advantages of the G6 system will not be available in SEEmiles.

6.1 A Potential Pitfall

In the past, when a module was moved to a different slot, it carried its configuration along and nothing about the card's behavior would change. This is still the case in "PASSIVE" mode.

Now, when in "ACTIVE" mode, the module will be reconfigured to the setting defined for the new slot position. This configuration might be different or perhaps at default settings. While great for card swapping in a service or maintenance case, it may be confusing when swapping cards for testing.

Also, there is a configuration entry for every known card type per slot. Therefore, it is important to check the configuration for the particular module type used.

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Appendix

Mapping of MICROSENS to TeraMile terminology

MICROSENS	TeraMile
NM1	NMS-4
NM2	NMS-3
NM3	NMS-6
NM3plus	NMS-7

Application Note

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Document ID: AN-15004_2015-11-23