

## **COMARCH OSS**

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# **MOBILE AND FIXED CORE – 5-17-0**

## **Functional Description**

## DOCUMENT DESCRIPTION

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## OSSMFC

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## TABLE OF CONTENTS

Document Description .....	2
Revision .....	3
Table of contents .....	5
Abbreviations .....	8
Notation Conventions .....	10
1 Preface .....	11
2 Overview .....	12
3 Product Concept .....	13
3.1 Architecture .....	13
3.2 Technical issues .....	13
3.3 Modelling .....	13
4 Supported use cases .....	18
MFC Interconnect .....	18
5 Functional Design .....	20
5.1 MFC Interconnect .....	20
5.1.1 Interconnect resources .....	20
5.1.2 Interconnect – Data model .....	20
5.1.3 Interconnect – Validations .....	21
5.1.4 Creating Interconnect .....	22
5.2 MFC Signalling Point Codes .....	22
5.2.1 MFC Signalling Point Codes Conversion algorithm .....	23
5.2.2 MFC Signalling Point Codes – Data model .....	23
5.2.3 MFC Signalling Point Codes – Validations .....	23
5.2.4 MFC Signalling Point Codes – Logical Functions .....	24
5.2.5 Creating Signalling Point Codes .....	25
5.3 MFC Global Title Address .....	26
5.3.1 MFC Global Title Address – Data model .....	26
5.3.2 MFC Global Title Address – Validations .....	26
5.3.3 MFC Global Title Address – Logical Functions .....	26
5.3.4 Creating Global Title Address .....	28
5.4 MFC Global Title Routing Entry .....	29
5.4.1 MFC Global Title Routing Entry – Data model .....	29
5.4.2 MFC Global Title Routing Entry – Validations .....	30
5.4.3 MFC Global Title Routing Entry – Logical Functions .....	30

5.5 MFC Domain trails .....	31
5.5.1 MFC Domain trails – SCTP Link.....	31
5.5.1.1 MFC Domain trails – SCTP Link – Data model .....	31
5.5.1.2 MFC Domain trails – SCTP Link – Validations .....	32
5.5.2 MFC Domain trails – TCP UDP Link .....	32
5.5.2.1 MFC Domain trails – TCP UDP Link – Data model .....	32
5.5.2.2 MFC Domain trails – TCP UDP Link – Validations .....	33
5.5.3 MFC Domain trails – Signalling Link .....	33
5.5.3.1 MFC Domain trails – Signalling Link – Data model .....	33
5.5.3.2 MFC Domain trails – Signalling Link Validations .....	34
5.5.4 MFC Domain trails – Signalling Link Set .....	34
5.5.4.1 MFC Domain trails – Signalling Link Set – Data model.....	35
5.5.4.2 Validations .....	35
5.5.5 MFC Domain trails – Signalling Route .....	35
5.5.5.1 MFC Domain trails – Signalling Route – Data model .....	35
5.5.5.2 MFC Domain trails – Signalling Route – Validations .....	35
5.5.5.3 MFC Domain trails – Signalling Route – Route Finder.....	36
5.5.6 MFC Domain trails – Signalling Route Set .....	36
5.5.6.1 MFC Domain trails – Signalling Route Set – Data model.....	36
5.5.6.2 MFC Domain trails – Signalling Route Set – Validation .....	36
5.5.6.3 MFC Domain trails – Signalling Route Set – Route finder .....	36
5.5.7 MFC Domain trails – Trunk Circuit .....	36
5.5.7.1 MFC Domain trails – Trunk Circuit – Data model .....	37
5.5.7.2 MFC Domain trails – Trunk Circuit – Validations .....	37
5.5.8 MFC Domain trails – Trunk Circuit Timeslot.....	37
5.5.8.1 MFC Domain trails – Trunk Circuit Timeslot – Data model .....	37
5.5.8.2 MFC Domain trails – Trunk Circuit Timeslot – Validations .....	38
5.5.9 MFC Domain trails – PRA Circuit .....	38
5.5.9.1 MFC Domain trails – PRA Circuit – Data model.....	38
5.5.9.2 MFC Domain trails – PRA Circuit – Validation .....	39
5.5.10 MFC Domain trails – Trunk Group .....	39
5.5.10.1 MFC Domain trails – Trunk Group – Data model .....	39
5.5.10.2 MFC Domain trails – Trunk Group – Validations .....	39
5.5.11 Creation of domain trails (e.g. SS7 Signalling Link & Link Set) .....	40
5.6 MFC Domain logical functions .....	42
5.6.1 Overview .....	42

## OSSMFC

5.6.2	Generic MFC logical function modelling .....	43
5.6.3	Creating MFC logical function (eg. generic MSC) .....	44
6	Cross domain Use Cases .....	45
	LIST OF FIGURES .....	47

## ABBREVIATIONS

The following abbreviations apply throughout this document:

<b>API</b>	Application Programming Interface
<b>ATCA</b>	Advanced Telecommunications Computing Architecture
<b>CG</b>	Charging Gateway
<b>DPC</b>	Destination Point Code
<b>GGSN</b>	Gateway GPRS Support Node
<b>GUI</b>	Graphic User Interface
<b>GT</b>	Global Title
<b>GTT</b>	Global Title Translation
<b>HLR</b>	Home Location Register
<b>HSS</b>	Home Subscriber Server
<b>IMS</b>	IP Multimedia Subsystem
<b>MME</b>	Mobility Management Entity
<b>MCC</b>	Mobile Country Code
<b>MNC</b>	Mobile Network Code
<b>MSC</b>	Mobile Switching Centre
<b>MSS</b>	Mobile Softswitch Solution
<b>NE</b>	Network Element





## OSSMFC

<b>NMS</b>	Network Management System
<b>OPC</b>	Originating Point Code
<b>PCRF</b>	Policy and Charging Rules Function
<b>PGW</b>	PDN Gateway
<b>oMGW</b>	Open Media Gateway
<b>SGW</b>	Serving Gateway
<b>SLS</b>	Signalling Link Selection
<b>STP</b>	Signalling Transfer Point
<b>SS7</b>	Signalling System No 7

## NOTATION CONVENTIONS

The following typographic conventions apply throughout this document:

	Important paragraphs are distinguished by exclamation marks.
	Cross-references to other documents are distinguished by the graphic symbol presented on the left.
<b>Objects</b>	All names of objects start with a capital letter, e.g. Address, Location.
<b>'quotation marks'</b>	All attribute values are marked by quotation marks, e.g. 'PATH_1'.
<b>Bold</b>	Names of other documents, commands, windows, tabs and other information that you must use literally appear in <b>bold</b> , e.g. <b>Framework Console Operations, Layers</b> .
<b>[BUTTON]</b>	Names of buttons appear in Courier New in square brackets and in bold, e.g. <b>[FINISH]</b> .
<b>Italics</b>	Names of object attributes appear in italics, e.g. <i>Name, Identifier</i> .
<u>Blue bold underlined</u>	References to other specific parts of the document appear as deep pink, bold and underlined text, e.g. <u>Blue bold underlined</u>

## 1 Preface



Please note that the screenshots in this document are provided for illustrative purposes only and should not be treated as an exact representation of the Console Graphical User Interface. It may differ depending on the software version and installed components. Additionally, the user may not have access to some functionalities or modules because of the lack of appropriate privileges.



Because of the Product-orientated nature of the document, please bear in mind that screens presented here should be treated as purely descriptive and instructive, and they may differ from the actual system version you are working with.

## 2 Overview

**Comarch Mobile and Fixed Core Inventory Management** is designed to facilitate the management of both physical and virtualized Core Network Elements, their logical configuration and signalling relations. It is based on the ETSI / 3GPP / TM Forum standards.

**Comarch Mobile and Fixed Core Management** helps mobile network operators manage vendors and a detailed inventory of mobile and fixed core networks: physical Network Elements and logical Network Functions. It provides PS and CS core inventory, starting from legacy PSTN/2G/3G through EPC and ending with network virtualization support for vEPC or 5GC. Our MFC product covers all aspects of core device configuration including:

- Signalling inventory (e.g. SS7, Diameter)
- Network map with signalling trails prepared by predefined wizards
- Semiautomatic tools for Mobile and Fixed Core elements configurations based on **Resource Specifications** and Configuration Management Templates

Integrated Network Auto-discovery and Reconciliation can provide a network-driven inventory that minimizes the overall amount of effort required to maintain an up-to-date inventory, which allows advanced and effective assurance.

## 3 Product Concept

### 3.1 Architecture

In Comarch's approach, **Mobile and Fixed Network** is a framework designed to enable fast and easy modelling of MFC network topologies in cases that require domain dedicated logic or validations such as signalling objects and links.

### 3.2 Technical issues

Comarch's **Mobile and Fixed Core** product provides multiple API endpoints to manage the data through other parts of Comarch OSS systems.

API: core-network

- AdvancedSearch reindexation of Interconnects
- AdvancedSearch reindexation of Signalling Point Codes
- AdvancedSearch reindexation of Global Title
- AdvancedSearch reindexation of Global Title Routing Entry
- Operations on Interconnect
- Operations on Signalling Point Code
- Operations on Global Title address
- Operations on Global Title Routing Entry

### 3.3 Modelling

**Comarch Mobile and Fixed Core Management** data modelling for Inventory (Physical and Logical part of MFC domain) is based on the definition of resources taken from the TMF634 standard.

The MFC network elements are built from resources which are physical or non-physical components (or a combination of these) within an enterprise's core network infrastructure. To model non-physical resources (for example: virtual machine, logical function) we use **OSS Resource Catalog** with **Resource Specifications** and for physical resources (for example: physical device, chassis, card) we use **OSS Device Library**. The future aim of the **OSS Resource Catalog** is to define a single entity to manage non-physical and physical resources. All information about the **Resource Specifications** and **Resource Catalog** the user can find in:



ComarchOSS\_FD\_TMFResourceCatalog.docx

**Mobile and Fixed Network** uses also Logical Function Framework, a component of Comarch OSS designed and provided for inventory of objects based on **Resource Catalog – Resource Specifications**. All information about Logical Function Framework the user can find in:



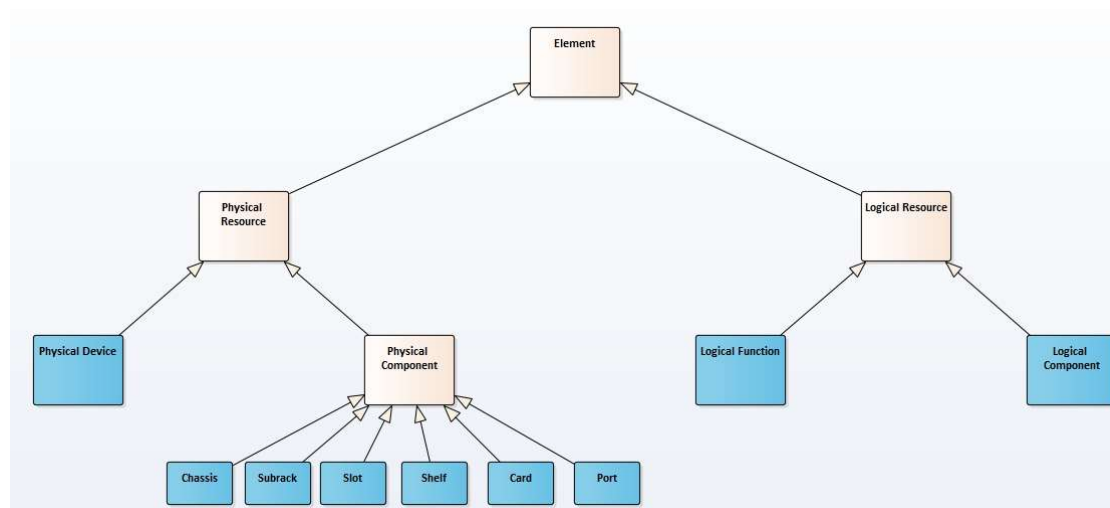
ComarchOSS\_FD\_OSSRC\_LogicalFunction.docx

## OSSMFC

Connections between resources are modelled using trails from Trail Framework, which is a crucial part of Comarch OSS Transport Product. All information about the Trail Framework the user can find in:



ComarchOSS\_FD\_OSSTPT\_Trail.docx



[Figure 1 MFC physical and logical inventory generic model](#)

## OSSMFC

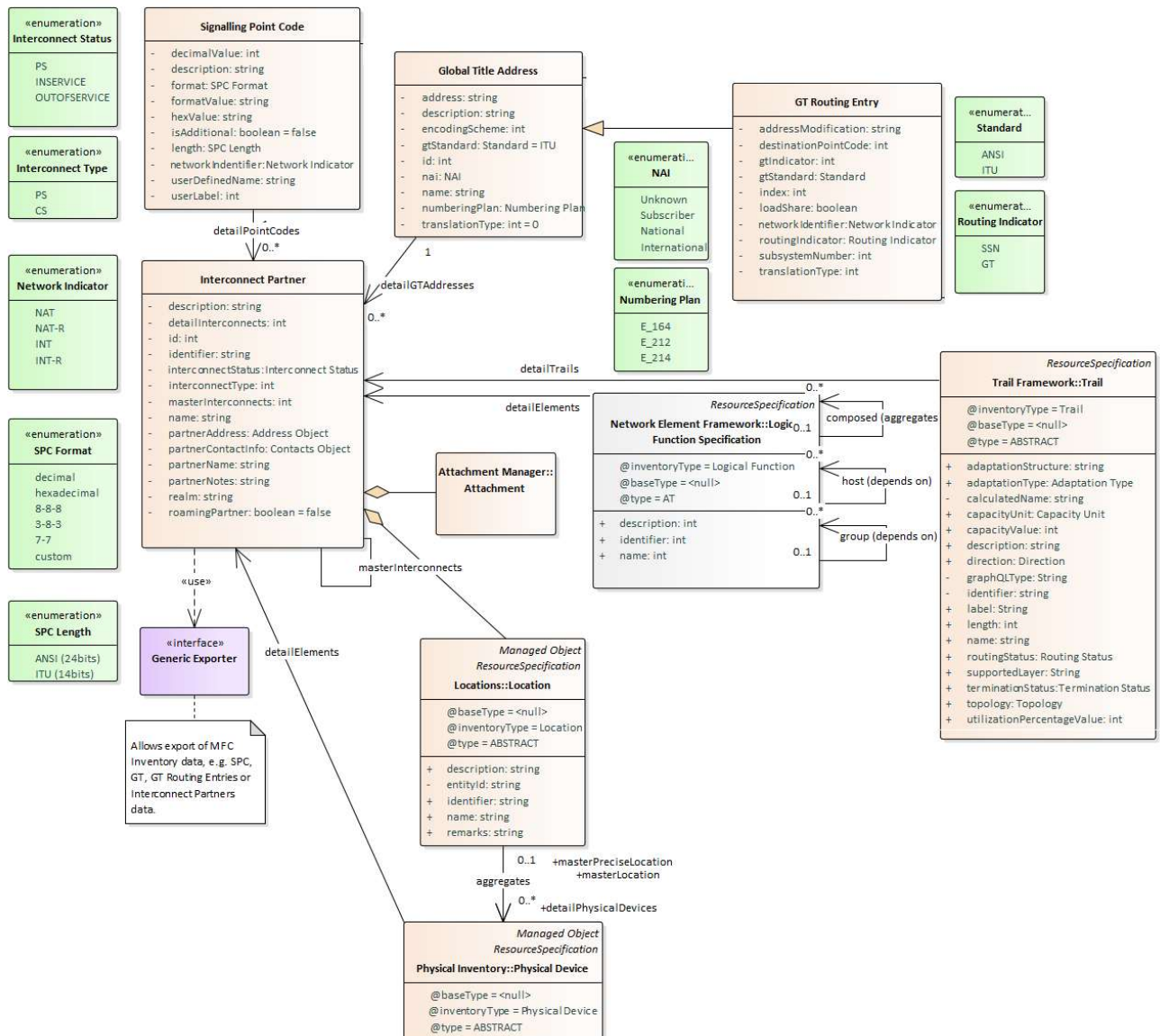


Figure 2 Interconnect, Global Title and Signalling Point Code model

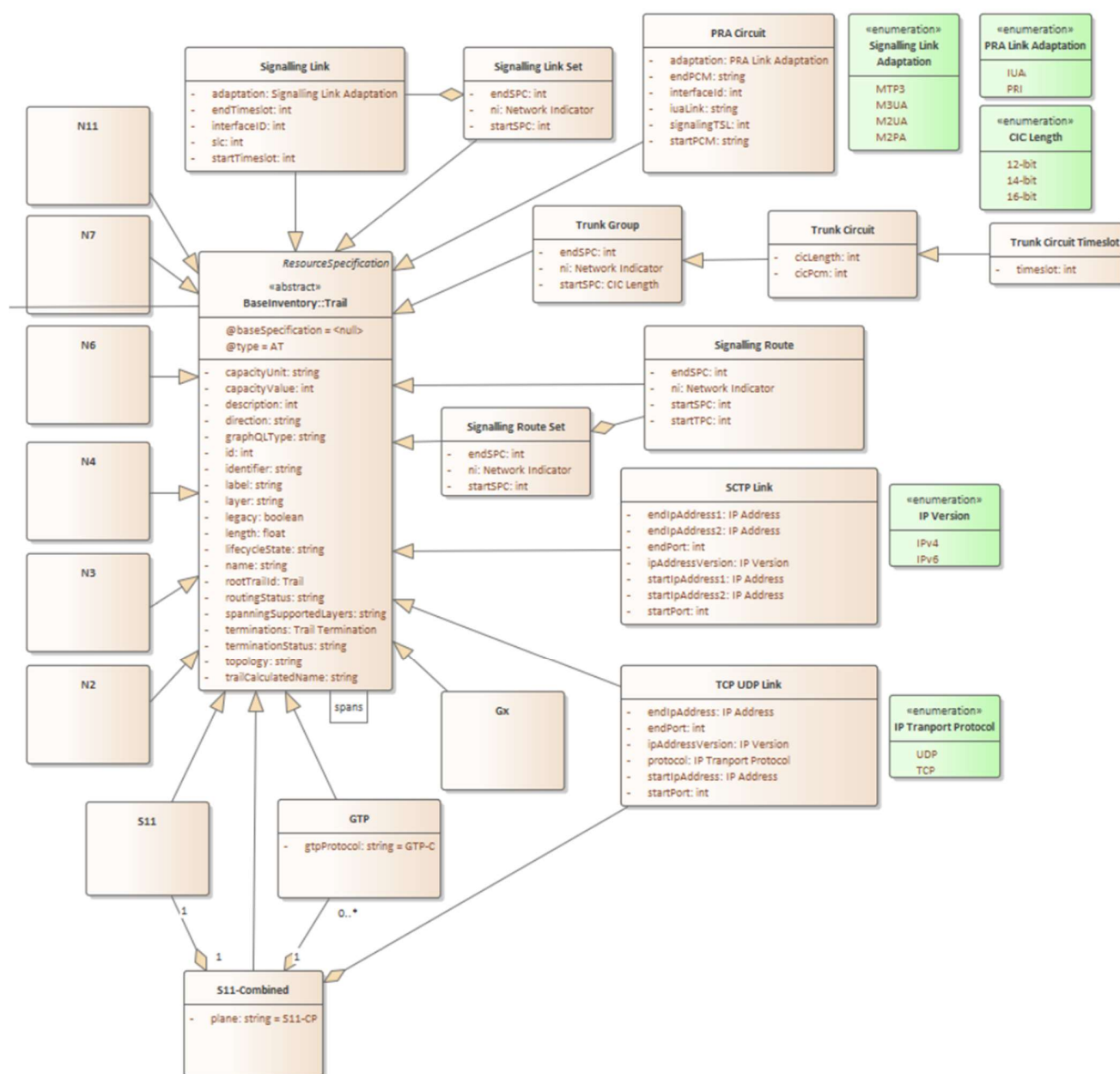


Figure 3 MFC trails model



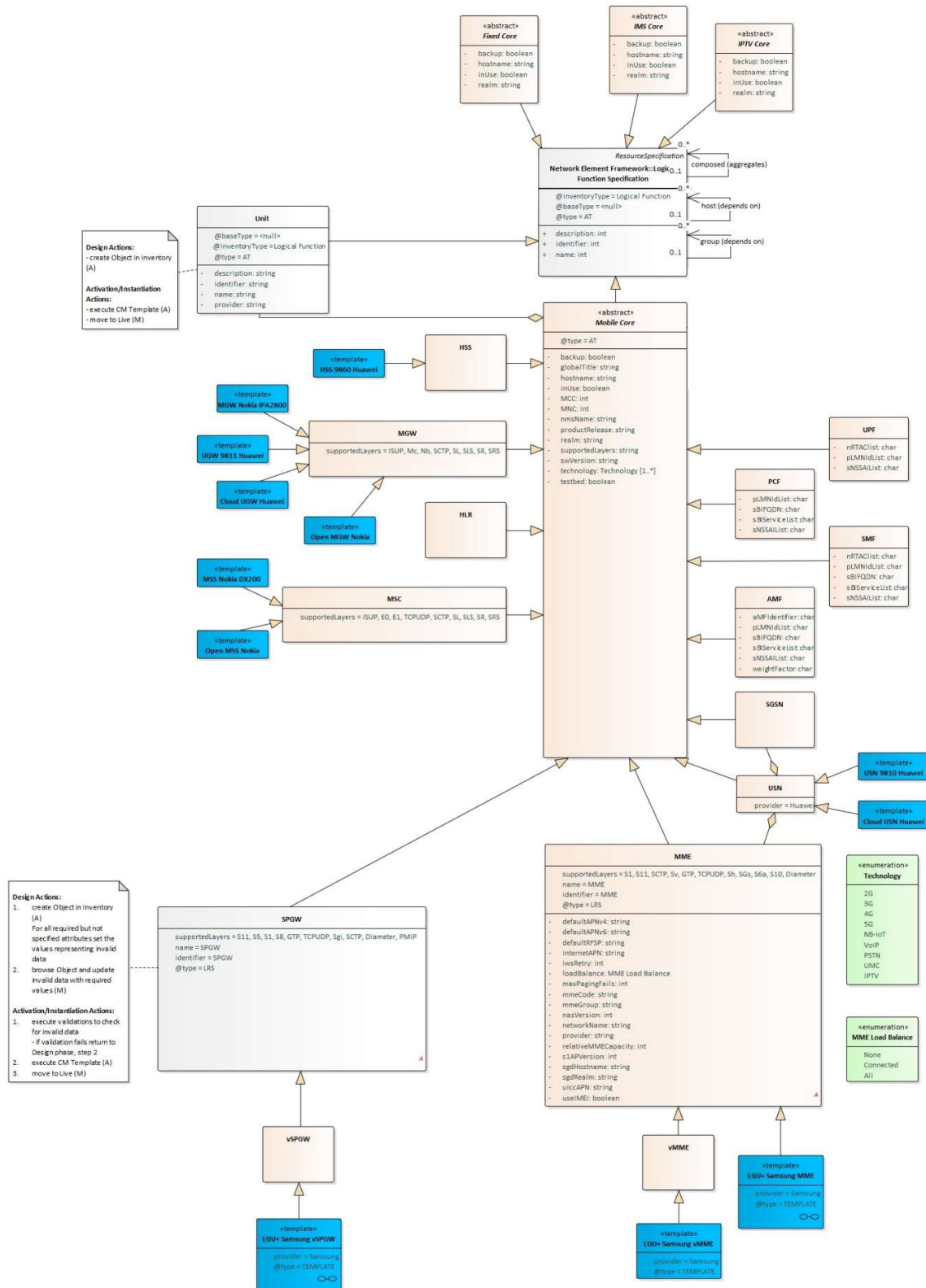


Figure 4 MFC logical functions

## 4 Supported use cases

UC_MFC_INV_1 – Create / Edit / Delete MFC NE based Interconnect connectivity	
Description	User can Create / Edit / Delete MFC NE based Interconnect connectivity
Additional Description	Users can create a point of connection between their own and partners' MFC NE for both CS and PS plane.
Reference to Documentation	<a href="#">MFC Interconnect</a>

UC_MFC_INV_2 – Create / Edit / Delete Signalling Point Codes (SS7 SPC)	
Description	User can Create / Edit / Delete Signalling Point Codes (SS7 SPC)
Additional Description	Users can create a SS7 SPC according to the ITU/ETSI/ANSI standards.
Reference to Documentation	<a href="#">MFC Signalling Point Codes</a>

UC_MFC_INV_3 – Create / Edit / Delete Global Title Address	
Description	User can Create / Edit / Delete Global Title Address
Additional Description	Users can create a Global Title Address according to the ITU/ETSI/ANSI standards.
Reference to Documentation	<a href="#">MFC Global Title Address</a>

UC_MFC_INV_4 – Create / Edit / Delete Global Title Routing Entry	
Description	User can Create / Edit / Delete Global Title Routing Entry
Additional Description	Users can create a Global Title Routing Entry according to the ITU/ETSI/ANSI standards.
Reference to Documentation	<a href="#">MFC Global Title Routing Entry</a>

## OSSMFC

## UC\_MFC\_INV\_5 – Create / Edit / Delete MFC Domain trails

Description	User can Create / Edit / Delete MFC Domain trails
Additional Description	Users can create MFC Domain trails according to ITU/ETSI/ANSI standards.
Reference to Documentation	<a href="#">MFC Domain trails</a>

## UC\_MFC\_INV\_6 – Create / Edit / Delete MFC Domain logical functions

Description	User can Create / Edit / Delete MFC Domain logical functions
Additional Description	Users can create MFC Domain logical functions according to <b>Resource Specifications in Resource Catalog</b> .
Reference to Documentation	<a href="#">MFC Domain logical functions</a>

## 5 Functional Design

### 5.1 MFC Interconnect

It represents interconnect between the core network (both PS and CS) and an external partner or customer including interconnect with international carriers, national telecoms and large customers (PABX) connected directly to core NEs.

This solution combines both general information about the interconnecting party and a reference to the NE resources used to provide the interconnect (such as service trails, ports and VS configuration elements, and reference to transport resources used for this service).

This supports only Live and Plan perspectives.

#### 5.1.1 Interconnect resources

- Signalling Point Codes
- Global Title Addresses
- Locations
- Trails
- Elements (ex. Logical Function)
- Attachments (files)

#### 5.1.2 Interconnect – Data model

Attribute	Mandatory	Description
<i>Interconnect Type</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ CS</li> <li>■ PS</li> </ul>
<i>Name</i>	YES	Interconnect name
<i>Partner Name</i>	NO	Name of interconnecting partner
<i>Partner Address</i>	NO	Address of interconnecting partner
<i>Partner Contact Info</i>	NO	Contact information (phone, email, etc.)
<i>Partner Notes</i>	NO	Notes regarding interconnect (eg. contractual information, SLA, operation hours, etc.)
<i>Realm</i>	NO	Realm address of interconnect partner
<i>Interconnect status</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ INSERVICE</li> <li>■ OUTOFSERVICE</li> <li>■ PS</li> </ul>

## OSSMFC

<i>Description</i>	NO	Additional information about Interconnect
<i>Identifier</i>	NO	Additional Interconnect identifier
<i>Vendor Dist Name</i>	NO	Vendor Distinguish Name
<i>Detail Point Code</i>	NO	List of SPCs of interconnecting partner
<i>Detail GT Address</i>	NO	List of Global Title Addresses of interconnecting partner
<i>Detail Locations</i>	NO	List of locations with networks borderlines
<i>Detail Trails</i>	NO	List of service trails involved in Interconnect
<i>Detail Elements</i>	NO	List of network elements involved in Interconnect
<i>Detail Interconnects</i>	NO	List of dependent IC partners used to carry payload
<i>Master Interconnects</i>	NO	List of Interconnects to carry their payload

### 5.1.3 Interconnect – Validations

- **Global uniqueness** – there can be only one object with a given name

## 5.1.4 Creating Interconnect

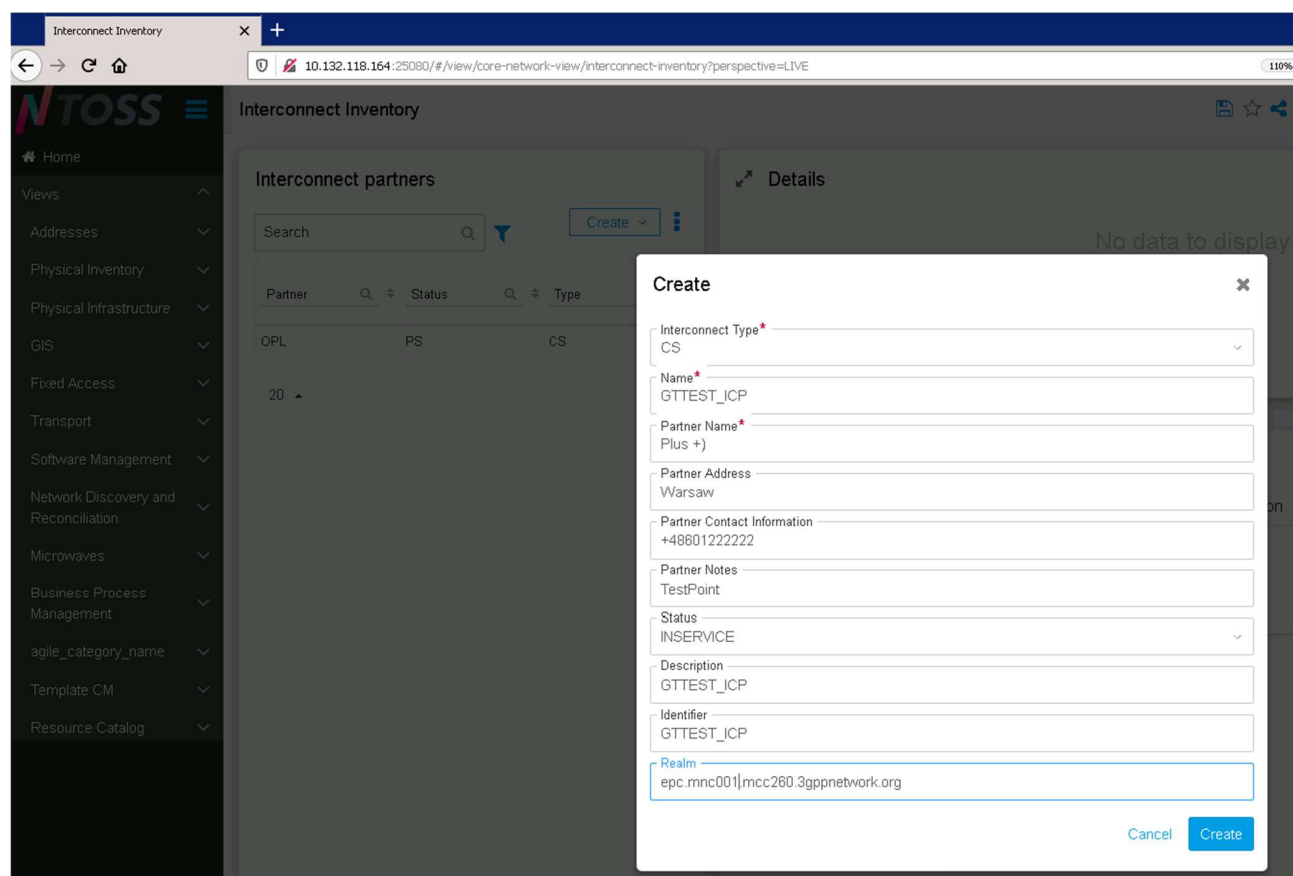


Figure 5 Creating Interconnect

## 5.2 MFC Signalling Point Codes

The Signalling Point Code (SPC) is the electronic address assigned to a network element within selected signalling network. Typically only one such address may be assigned, but in some cases additional SPCs or aliases can be also defined (not supported).

In CA OSS this address is stored as a decimal number, however there are different ways to display this value.

Depending on the network, a point code can be 24 bits (North America, China), 16 bits (Japan), or 14 bits (ITU standard, International SS7 network and most countries) in length.

The display format can be: decimal, hexadecimal, 8-8-8 (group of bits for ANSI SPCs), 3-8-3 (group of bits, ITU SPCs), also in Poland, format 7-7 is used.

## 5.2.1 MFC Signalling Point Codes Conversion algorithm

The conversion algorithms between decimal and selected formats are the following:

- SPC decimal to 7-7 (A-B):  $A = \text{int}(\text{SPC}/128)$ ,  $B = \text{mod}(\text{SPC}/128)$ , all leading zeros are recommended, each part has a maximum of 3 characters
- SPC decimal to 3-8-3 (A-B-C):  $A = \text{int}(\text{SPC}/2048)$ ,  $B = \text{mod}(\text{int}(\text{SPC}/128)/128)$ ,  $C = \text{mod}(\text{SPC}/8)$ , leading zeros for part B are recommended, maximum of 3 characters
- 7-7 (A-B) to SPC decimal:  $\text{SPC} = A * 128 + B$
- 3-8-3 (A-B-C) to SPC decimal:  $\text{SPC} = A * 2048 + B * 8 + C$
- to hexadecimal: standard dec2hex conversion, leading zeros optional

## 5.2.2 MFC Signalling Point Codes – Data model

Attribute	Mandatory	Description
<i>Length</i>	YES	Length of Signalling Point Code in bits. One of the following: <b>ANSI</b> (24 bits), <b>ITU</b> (14 bits).
<i>Format</i>	YES	The format of Signalling Point Code field display. Example: <b>decimal</b> (default), <b>hexadecimal</b> , <b>8-8-8</b> , <b>3-8-3</b> , <b>7-7</b> , <b>4-3-4-3</b>
<i>Network Identifier (NI)</i>	YES	Identifier of signalling network. One of the following: <b>NAT</b> , <b>NAT_R</b> , <b>INT</b> , <b>INT_R</b>
<i>Value Decimal</i>	YES	Decimal value of Signalling Point Code between 0.. <b>16777215</b> ( <b>ANSI</b> ) or 0.. <b>16383</b> ( <b>ITU</b> )
<i>Assigned To</i>	NO	Relation to Logical Function to which the Signalling Point Code is assigned
<i>Name</i>	NO	Name of Signalling Point Code calculated by naming-service (by default) or provided by the user
<i>Description</i>	NO	Additional information about Signalling Point Code

## 5.2.3 MFC Signalling Point Codes – Validations

- **Global uniqueness** – there can be only one object with a given name
- **Assignment restrictions** – it can be assigned to only one Network Element (or Logical Function), any network element can have many SPC assigned, but with different *Network Identifier*

## OSSMFC

- **Value decimal range** – accepted *valueDecimal* range:

Length	Min	Max
ANSI	0	16 777 215
ITU	0	16 383

- **Format** – format bits sum must be equal to length:

Length	Number of bits	Example format
ANSI	24	8-8-8,
ITU	14	3-8-3, 7-7, 4-3-4-3

## 5.2.4 MFC Signalling Point Codes – Logical Functions

Signalling Point Code can be assigned to the Logical Functions listed below:

- RNCFunction (DL model from RAN domain)
- BSCFunction (DL model from RAN domain)
- MSS
- MSC
- CSMGW
- HLR/HSS
- STP
- TAS
- VMS
- CSCF
- MGCF
- SMSC
- SGSN/MME
- GGSN
- GMLC
- RNC
- BSC
- GenericGateway
- GenericServer



## 5.2.5 Creating Signalling Point Codes

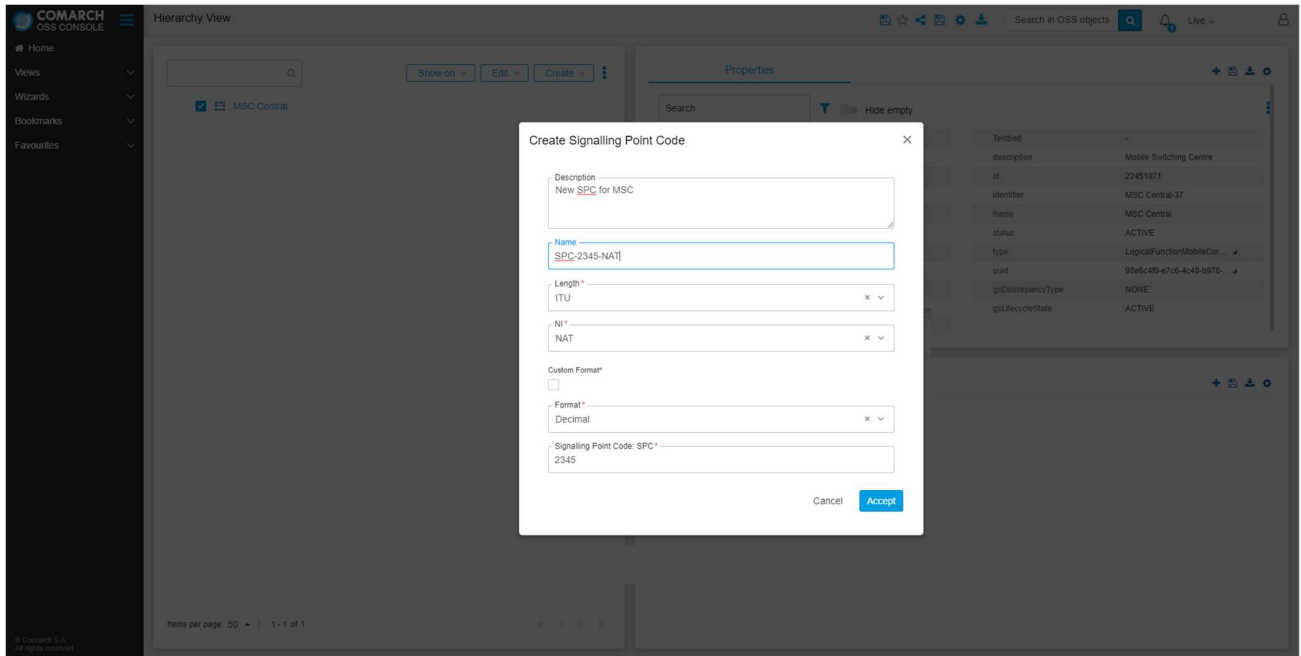


Figure 6 Creating SPC – wizard

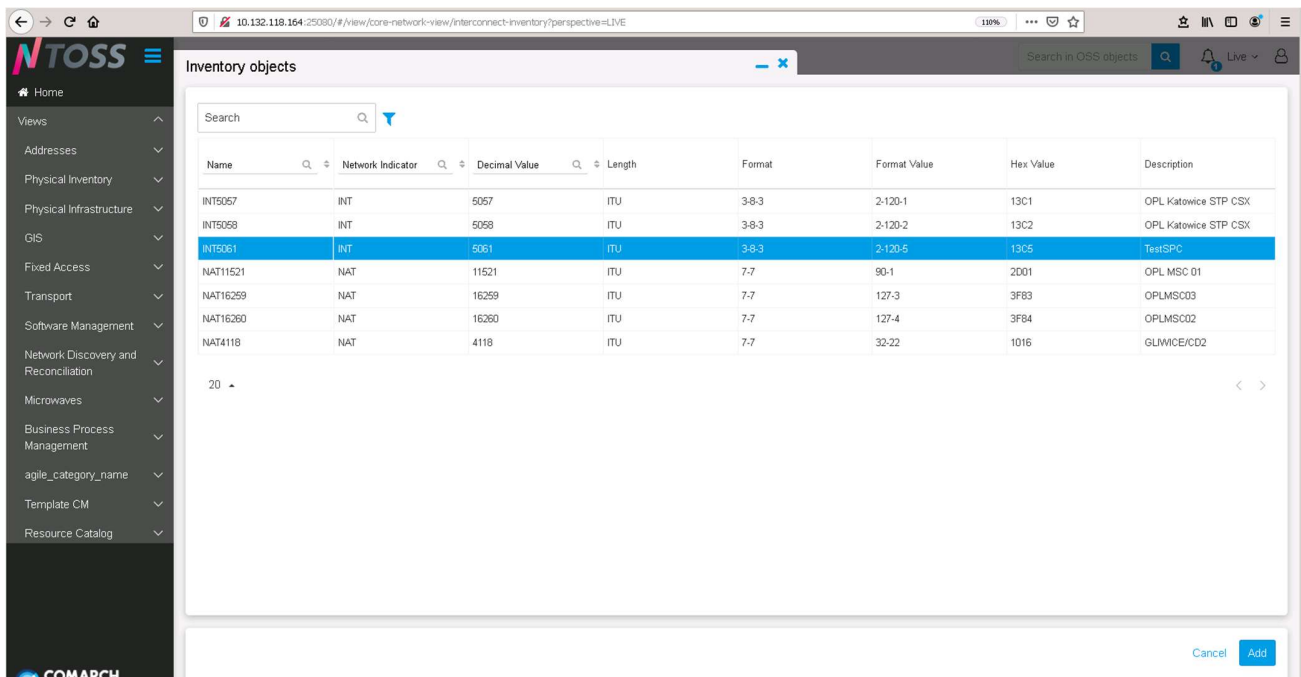


Figure 7 SPCs in Inventory View

## 5.3 MFC Global Title Address

Global Title is an electronic address that identifies an entity in telecommunication network.

The entity can be either a network element or a network subscriber.

Global Title addressing is described in section 3.4 of ITU recommendation Q.713.

### 5.3.1 MFC Global Title Address – Data model

Attribute	Mandatory	Description
<i>Address</i>	YES	One or more digits 0-9,B,C,F
<i>Nature of Address Indication (NAI)</i>	YES	Nature of address indicator. The type of number which is used in addressing. Acceptable values: <ul style="list-style-type: none"> <li>■ unknown</li> <li>■ subscriber number</li> <li>■ national (significant) number</li> <li>■ international number</li> </ul>
<i>Numbering Plan</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ E.164</li> <li>■ E.212</li> <li>■ E.214</li> </ul>
<i>Assigned To</i>	YES	Relation to Logical Function which the Global Title Address is assigned to
<i>Name</i>	NO	Global Title Address name
<i>Identifier</i>	NO	Additional Global Title Address identifier
<i>Description</i>	NO	Additional information about Global Title Address
<i>Vendor Dist Name</i>	NO	Vendor Distinguish Name

### 5.3.2 MFC Global Title Address – Validations

- **Global uniqueness** – there can be only one object with a given name
- **Address range** – the address may contain only one or more digits 0-9, B, C, F

### 5.3.3 MFC Global Title Address – Logical Functions

Global Title Address can be assigned to the Logical Functions listed below:

- RNCFunction (DL model from RAN domain)
- BSCFunction (DL model from RAN domain)
- MSS

## OSSMFC

- MSC
- CSMGW
- HLR/HSS
- STP
- TAS
- VMS
- CSCF
- MGCF
- SMSC
- SGSN/MME
- GGSN
- GMLC
- RNC
- BSC
- GenericGateway
- GenericServer

5.3.4 Creating Global Title Address

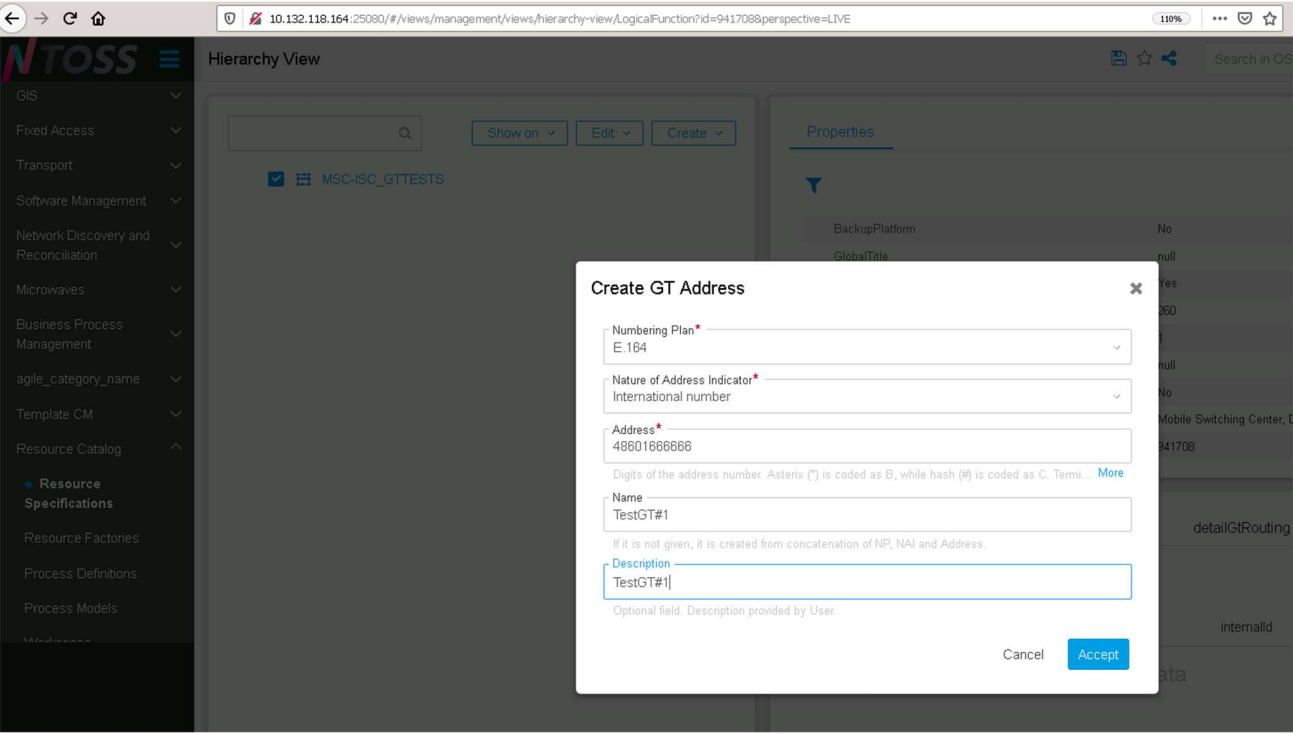


Figure 8 Creating GT Address – wizard

## 5.4 MFC Global Title Routing Entry

Signalling Transfer devices use Global Title addressing to route signalling messages through the network. Once the message enters the system, a routing decision must be made.

The result should point to a destination point (next hop) with indication what must be done when the message enters the next hop device. Routing entries are represented as objects in the database, as the structure doesn't fit into the trail concept. GT routing entry is based on the longest match rule, so one single entry can define an infinite number of destinations.

A GT routing entry can also provide information how to modify the attributes of a GT Address, based on a certain rule, before the signalling message is routed further.

From Inventory View, the user is able to see the GT address assigned to network elements (if applicable). Additionally, a separate view is accessible to maintain GT routing entries existing or planned on a particular network element (Logical Function).

### 5.4.1 MFC Global Title Routing Entry – Data model

Attribute	Mandatory	Description
<i>GT Standard</i>	YES	Global title standard Acceptable values: <ul style="list-style-type: none"> <li>■ ITU</li> <li>■ ANSI</li> </ul>
<i>GT Indicator</i>	YES	Acceptable values: 0 - no global title included 1 - global title includes <i>Nature of address indicator</i> only 2 - global title includes <i>Translation type</i> only 3 - global title includes <i>Translation type</i> , <i>Numbering plan</i> and <i>Encoding scheme</i> 4 - global title includes <i>Translation type</i> , <i>Numbering plan</i> , <i>Encoding scheme</i> and <i>Nature of address indicator</i>
<i>Numbering Plan</i>	YES	Numbering plan. Only the most popular options: ISDN, Land mobile and ISDN mobile can be kept in inventory. Acceptable values: <ul style="list-style-type: none"> <li>■ E.164</li> <li>■ E.212</li> <li>■ E.214</li> </ul>
<i>NAI</i>	YES	Nature of address indicator. The type of number which is used in addressing. Acceptable values: <ul style="list-style-type: none"> <li>■ unknown</li> <li>■ subscriber number</li> <li>■ national (significant) number</li> <li>■ international number</li> </ul>

## OSSMFC

<i>Address</i>	YES	One or more digits 0-9,B,C,F
<i>Routing Indicator</i>	YES	Routing indicator – what to do with addressing when reaching next hop. Acceptable values: ■ SSN ■ GT
<i>Destination Point Code</i>	YES	Destination point code of next hop.
<i>Subsystem Number</i>	NO	The identifier of application to be involved at the next hop. Allowed values must be within range 0..254
<i>Translation Type</i>	YES	Allowed values must be within range 0..254
<i>Index</i>	NO	Entry order index within the group. The group is made of entries with the same GT standard, GTI, NP, NAI and Address values.
<i>Load Share</i>	YES	Indicates that entry is considered for load sharing.
<i>Address Modification</i>	NO	One or more digits 0-9,B,C,F.
<i>Assigned To</i>	YES	Relation to Logical Function which the Global Title Routing Entry is assigned to
<i>Name</i>	NO	Global Title Routing Entry name
<i>Identifier</i>	NO	Additional Global Title Routing Entry identifier
<i>Description</i>	NO	Additional information about Global Title Routing Entry

### 5.4.2 MFC Global Title Routing Entry – Validations

- **Global uniqueness** – there can be only one object with a given name
- **Mandatory attributes** – *Index* is mandatory in Network and Live perspective
- **Attribute range** – *GT Indicator* range 0..4
- **Attribute range** – *Translation Type* range 0..254
- **Attribute range** – Address range 0-9, B, C, F
- **Attribute range** – *Subsystem Number* range 0..254
- **Point Code existence** – Destination Point Code must exist in inventory

### 5.4.3 MFC Global Title Routing Entry – Logical Functions

Global Title Routing Entry can be assigned to the Logical Functions listed below:

- RNCFunction (DL model from the RAN domain)
- BSCFunction (DL model from the RAN domain)
- MSS

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- MSC
- CSMGW
- HLR/HSS
- STP
- TAS
- VMS
- CSCF
- MGCF
- SMSC
- SGSN/MME
- GGSN
- GMLC
- RNC
- BSC
- GenericGateway
- GenericServer

## 5.5 MFC Domain trails

The **Mobile & Fixed Core** product provides API and wizards for the following trails:

- SCTP Link
- TCP UDP Link
- Signalling Link
- Signalling Link Set
- Signalling Route
- Signalling Route Set
- Trunk Circuit
- Trunk Circuit Timeslot
- PRA Circuit
- Trunk Group

### 5.5.1 MFC Domain trails – SCTP Link

Supported layer: **SCTP**

#### 5.5.1.1 MFC Domain trails – SCTP Link – Data model

Attribute	Mandatory	Description
<i>IP Address Version</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ IPv4</li> <li>■ IPv6</li> </ul>
<i>Start IP Address 1</i>	YES	IF <i>IP Address Version</i> == IPv4 THEN format of <i>Start IP Address 1</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>Start IP Address 1</i> must be validated as IPv6

## OSSMFC

<i>Start IP Address 2</i>	NO	IF <i>IP Address Version</i> == IPv4 THEN format of <i>Start IP Address 2</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>Start IP Address 2</i> must be validated as IPv6
<i>Start Port</i>	YES	Allowed numbers: 0 - 65535
<i>End IP Address 1</i>	YES	IF <i>IP Address Version</i> == IPv4 THEN format of <i>End IP Address 1</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>End IP Address 1</i> must be validated as IPv6
<i>End IP Address 2</i>	NO	IF <i>IP Address Version</i> == IPv4 THEN format of <i>End IP Address 2</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>End IP Address 2</i> must be validated as IPv6
<i>End Port</i>	YES	Allowed numbers: 0 - 65535

## 5.5.1.2 MFC Domain trails – SCTP Link – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **IP Address Format**
- **Port Range**

## 5.5.2 MFC Domain trails – TCP UDP Link

Supported layer: **TCP or UDP** (depends on the used Protocol).

## 5.5.2.1 MFC Domain trails – TCP UDP Link – Data model

Attribute	Mandatory	Description
<i>IP Address Version</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ IPv4</li> <li>■ IPv6</li> </ul>
<i>Protocol</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ TCP</li> <li>■ UDP</li> </ul> (Supported Layer is set accordingly)
<i>Start IP Address</i>	YES	IF <i>IP Address Version</i> == IPv4 THEN format of <i>Start IP Address</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>Start IP Address</i> must be validated as IPv6
<i>Start Port</i>	YES	Allowed numbers: 0 - 65535



## OSSMFC

<i>Start Link Name</i>	NO	Start Link Name
<i>End IP Address</i>	YES	IF <i>IP Address Version</i> == IPv4 THEN format of <i>End IP Address</i> must be validated as IPv4 IF <i>IP Address Version</i> == IPv6 THEN format of <i>End IP Address</i> must be validated as IPv6
<i>End Port</i>	YES	Allowed numbers: 0 - 65535
<i>End Link Name</i>	NO	End Link Name

## 5.5.2.2 MFC Domain trails – TCP UDP Link – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **IP Address Format**
- **Port Range**
- **Termination** – depends on the used Protocol

## 5.5.3 MFC Domain trails – Signalling Link

Supported layer: **SignallingLink**

## 5.5.3.1 MFC Domain trails – Signalling Link – Data model

Attribute	Mandatory	Description
<i>Adaptation</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ M3UA</li> <li>■ M2UA</li> <li>■ MTP3</li> <li>■ M2PA</li> </ul>
<i>SLC</i>	IF <i>Adaptation</i> == MTP3 or M2PA THEN YES IF <i>Adaptation</i> != MTP3 or M2PA THEN NO	Allowed numbers: 0 - 15
<i>Start Timeslot</i>	IF <i>Adaptation</i> == MTP3 THEN YES IF <i>Adaptation</i> != MTP3 THEN NO	Allowed numbers: 1 - 31 IF <i>Adaptation</i> IN (M2UA, M3UA, M2PA) THEN the field <i>Start Timeslot</i> will be disabled. If a value was provided in the field, it will be removed.
<i>End Timeslot</i>	IF <i>Adaptation</i> == MTP3 THEN YES IF <i>Adaptation</i> != MTP3 THEN NO	Allowed numbers: 1 - 31 IF <i>Adaptation</i> IN (M2UA, M3UA, M2PA) THEN <i>End Timeslot</i> will be disabled. If a value was provided in the field, it will be removed.
<i>Interface ID</i>	NO	Numbers allowed: 0 - 4294967295 IF <i>Adaptation</i> IN (M3UA, MTP3, M2PA) THEN <i>Interface ID</i> will

be disabled. If a value was provided in the field, it will be removed.

### 5.5.3.2 MFC Domain trails – Signalling Link Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **Port Range** (for Signalling Link with M2PA adaptation routed over SCTP Link) – at least one SCTP port should be set to 3565. If there is only one SCTP association (link) between network elements, both ports should have the 3565 value to allow SCTP link to carry the M2PA signalling.
- **Trail routing** – acceptable routing trails layers depend on adaptation:

Adaptation	Supported routing layer
M2PA	<ul style="list-style-type: none"> <li>■ - 3rd Party Network</li> <li>■ - SCTP Link</li> </ul>
M2UA	<ul style="list-style-type: none"> <li>■ - 3rd Party Network</li> <li>■ - SCTP Link</li> <li>■ - MUA Link</li> </ul>
M3UA	<ul style="list-style-type: none"> <li>■ - 3rd Party Network</li> <li>■ - SCTP Link</li> <li>■ - MUA Link</li> </ul>
MTP3	<ul style="list-style-type: none"> <li>■ - 3rd Party Network</li> <li>■ - E0</li> <li>■ - E1</li> <li>■ - T0</li> <li>■ - T1</li> </ul>

### 5.5.4 MFC Domain trails – Signalling Link Set

Supported layer: **SignallingLinkSet**

### 5.5.4.1 MFC Domain trails – Signalling Link Set – Data model

Attribute	Mandatory	Description
<i>NI</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NAT</li> <li>■ NAT-R</li> <li>■ INT</li> <li>■ INT-R</li> </ul>
<i>Start SPC</i>	YES	Allowed numbers: 0 - 16383
<i>End SPC</i>	YES	Allowed numbers: 0 - 16383

### 5.5.4.2 Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**
- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated
- **Trail routing** – can be routed over Signalling Link

### 5.5.5 MFC Domain trails – Signalling Route

Supported layer: **SignallingRoute**

#### 5.5.5.1 MFC Domain trails – Signalling Route – Data model

Attribute	Mandatory	Description
<i>NI</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NA0</li> <li>■ NA1</li> <li>■ IN0</li> <li>■ IN1</li> </ul>
<i>Start SPC</i>	YES	Allowed numbers: 0 - 16383
<i>End SPC</i>	YES	Allowed numbers: 0 - 16383
<i>Start TPC</i>	YES	Allowed numbers: 0 - 16383

#### 5.5.5.2 MFC Domain trails – Signalling Route – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**

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- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated
- **Trail routing** – acceptable routing trails are Signalling Link Sets belonging to the same signalling network (i.e. with the same NI)

### 5.5.5.3 MFC Domain trails – Signalling Route – Route Finder

During Signalling Route creation, Route Finder can find and add to the routing Signalling Link Sets used by the route. The logic analyses other Signalling Routes and Signalling Link Sets (from the same signalling network) defined in OSS **Resource Inventory** and adds appropriate Signalling Link Sets to the routing of created Signalling Route to form (if possible) a continuous path from Start SPC to End SPC.

## 5.5.6 MFC Domain trails – Signalling Route Set

Supported layer: **SignallingRouteSet**

### 5.5.6.1 MFC Domain trails – Signalling Route Set – Data model

Attribute	Mandatory	Description
<i>NI</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NAT</li> <li>■ NAT-R</li> <li>■ INT</li> <li>■ INT-R</li> </ul>
<i>Start SPC</i>	YES	Numbers allowed: 0 - 16383
<i>End SPC</i>	YES	Numbers allowed: 0 - 16383

### 5.5.6.2 MFC Domain trails – Signalling Route Set – Validation

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**
- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated
- **Trail routing** – acceptable routing trails are Signalling Routes belonging to the same signalling network (i.e. with the same NI)

### 5.5.6.3 MFC Domain trails – Signalling Route Set – Route finder

During Signalling Route Set creation, Route Finder can find and add to the routing all Signalling Routes used by the route set. The logic analyses Signalling Routes defined in OSS Resource Inventory with the same values of NI, Start SPC, End SPC and adds the appropriate ones to the routing.

## 5.5.7 MFC Domain trails – Trunk Circuit

Supported layer: **ISUP**

### 5.5.7.1 MFC Domain trails – Trunk Circuit – Data model

Attribute	Mandatory	Description
<i>Signalling Network</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NAT</li> <li>■ NAT-R</li> <li>■ INT</li> <li>■ INT-R</li> </ul>
<i>CIC Length</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ 12-bit</li> <li>■ 14-bit</li> <li>■ 16-bit</li> </ul>
<i>CIC PCM</i>	YES	IF <i>CIC Length</i> == 12-bit THEN acceptable numbers: 0 - 127 IF <i>CIC Length</i> == 14-bit THEN acceptable numbers: 0 - 511 IF <i>CIC Length</i> == 16-bit THEN acceptable numbers: 0 - 2047
<i>Start SPC</i>	YES	Allowed numbers: 0 - 16383
<i>End SPC</i>	YES	Allowed numbers: 0 - 16383
<i>Start Name</i>	NO	Start Name
<i>End Name</i>	NO	End Name

### 5.5.7.2 MFC Domain trails – Trunk Circuit – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**
- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated

## 5.5.8 MFC Domain trails – Trunk Circuit Timeslot

Supported layer: **ISUP**

### 5.5.8.1 MFC Domain trails – Trunk Circuit Timeslot – Data model

Attribute	Mandatory	Description
<i>Signalling Network</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NAT</li> <li>■ NAT-R</li> <li>■ INT</li> <li>■ INT-R</li> </ul>
<i>CIC Length</i>	YES	Acceptable values:

		<ul style="list-style-type: none"> <li>■ 12-bit</li> <li>■ 14-bit</li> <li>■ 16-bit</li> </ul>
<i>Timeslot</i>	YES	Allowed numbers: 1 - 31
<i>CIC</i>	YES	IF <i>CIC Length</i> == 12-bit THEN acceptable numbers: 0 - 4095 IF <i>CIC Length</i> == 14-bit THEN acceptable numbers: 0 - 16383 IF <i>CIC Length</i> == 16-bit THEN acceptable numbers: 0 - 65534
<i>Start SPC</i>	YES	Allowed numbers: 0 - 16383
<i>End SPC</i>	YES	Allowed numbers: 0 - 16383
<i>Start Name</i>	NO	Start Name
<i>End Name</i>	NO	End Name

### 5.5.8.2 MFC Domain trails – Trunk Circuit Timeslot – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**
- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated

### 5.5.9 MFC Domain trails – PRA Circuit

Supported layer: **PRA**

#### 5.5.9.1 MFC Domain trails – PRA Circuit – Data model

Attribute	Mandatory	Description
<i>Adaptation</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ IUA</li> <li>■ PRI</li> </ul>
<i>Start Name</i>	YES	Start Name
<i>End Name</i>	YES	End Name
<i>Start Signalling Name</i>	YES	Start Signalling Name
<i>End Signalling Name</i>	YES	End Signalling Name
<i>Start PCM</i>	IF <i>Adaptation</i> == PRI THEN YES IF <i>Adaptation</i> != PRI THEN NO	IF <i>Adaptation</i> != PRI THEN <i>Start PCM</i> will be disabled. If a value was provided in the field, it will be removed.

## OSSMFC

<i>End PCM</i>	IF <i>Adaptation</i> == PRI THEN YES IF <i>Adaptation</i> != PRI THEN NO	IF <i>Adaptation</i> != PRI THEN <i>End PCM</i> will be disabled. If a value was provided in the field, it will be removed.
<i>Signalling TSL</i>	IF <i>Adaptation</i> == PRI THEN YES IF <i>Adaptation</i> != PRI THEN NO	Numbers allowed: 1 - 31 IF <i>Adaptation</i> != PRI THEN <i>Signalling TSL</i> will be disabled. If a value was provided in the field, it will be removed.
<i>IUA Link</i>	IF <i>Adaptation</i> == IUA THEN YES IF <i>Adaptation</i> != IUA THEN NO	IF <i>Adaptation</i> != IUA THEN <i>IUA Link</i> will be disabled. If a value was provided in the field, it will be removed.
<i>Interface ID</i>	IF <i>Adaptation</i> == IUA THEN YES IF <i>Adaptation</i> != IUA THEN NO	Numbers allowed: 0 - 65534 IF <i>Adaptation</i> != IUA THEN <i>Interface ID</i> will be disabled. If a value was provided in the field, it will be removed.

## 5.5.9.2 MFC Domain trails – PRA Circuit – Validation

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key

## 5.5.10 MFC Domain trails – Trunk Group

Supported layer: **ISUP**

## 5.5.10.1 MFC Domain trails – Trunk Group – Data model

Attribute	Mandatory	Description
<i>Signalling Network</i>	YES	Acceptable values: <ul style="list-style-type: none"> <li>■ NAT</li> <li>■ NAT-R</li> <li>■ INT</li> <li>■ INT-R</li> </ul>
<i>Start SPC</i>	YES	Allowed numbers: 0 - 16383
<i>End SPC</i>	YES	Allowed numbers: 0 - 16383
<i>Start Name</i>	NO	Start Name
<i>End Name</i>	NO	End Name

## 5.5.10.2 MFC Domain trails – Trunk Group – Validations

- **Mandatory attributes**
- **Global uniqueness** – there can be only one trail with a given business key
- **SPC Range**

## OSSMFC

- **SPC Assignment** – SPC given as Start SPC and End SPC must be assigned to logical functions on which the trail is terminated

### 5.5.11 Creation of domain trails (e.g. SS7 Signalling Link & Link Set)

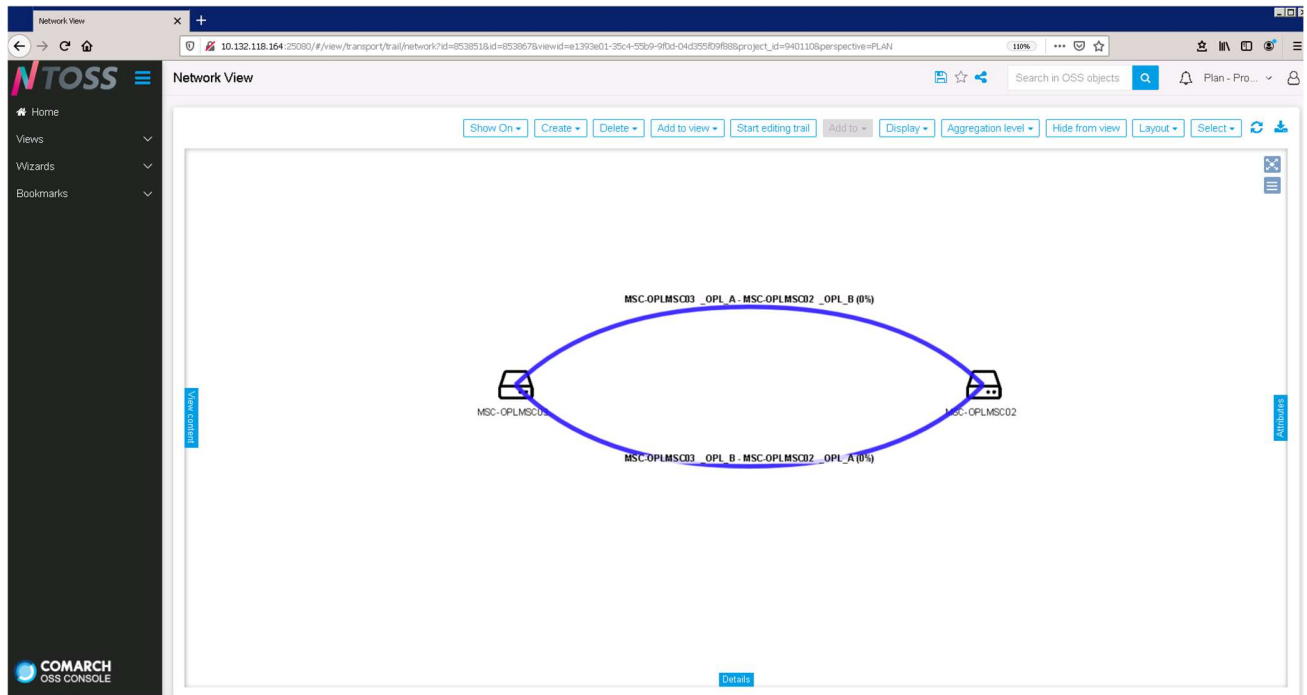
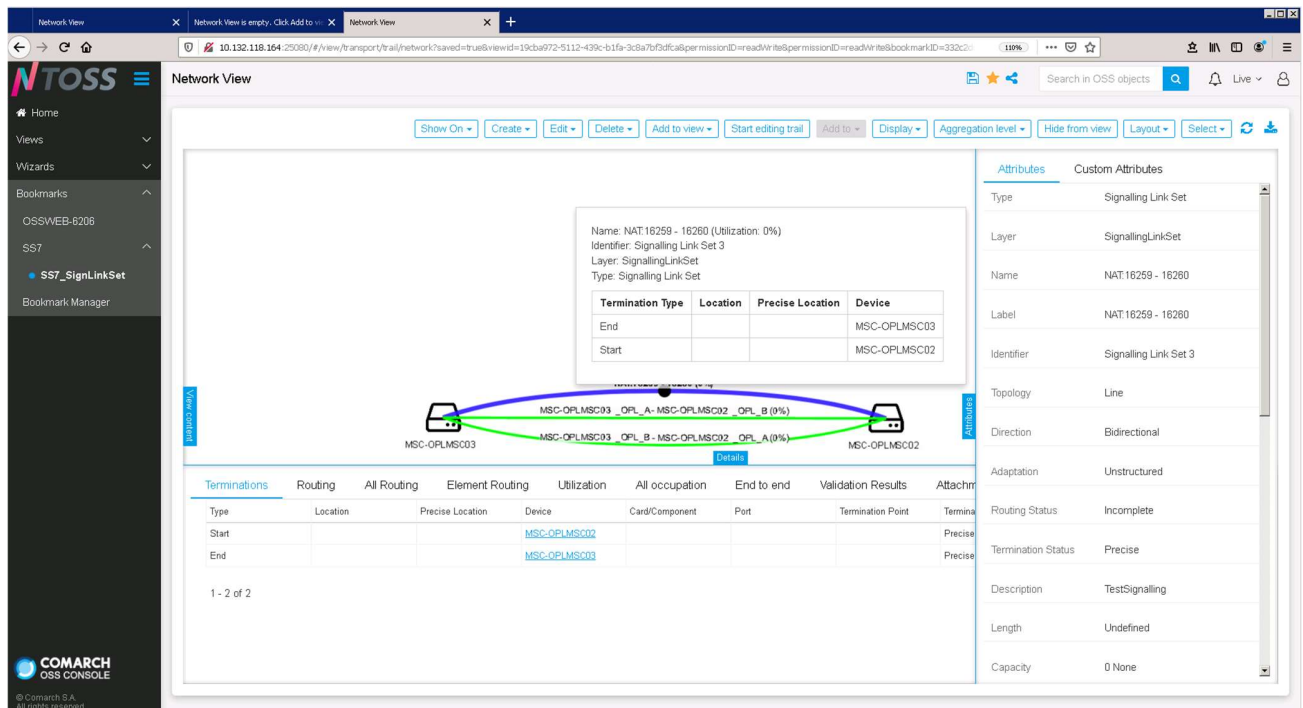


Figure 9 Signalling Links





[Figure 10 Signalling Link Set routed over Signalling Links](#)

## 5.6 MFC Domain logical functions

### 5.6.1 Overview

In the Comarch's approach Logical Function is a fundamental part of a framework designed to enable fast and easy modelling of logical/virtualized Network Elements in cases that do not require any dedicated logic or validations. **Mobile and Fixed Core Network** framework enables fast and easy creation of MFC network elements, eg. HSS, MSS, MGW, etc. using wizard for creation of Logical Function and defined **Resource Specifications** from **Resource Catalog**. **Mobile and Fixed Core** product offers some pre-defined resource specifications of core network elements (with the internal structure) manufactured by some well-known vendors:

- MSS/MS: Nokia DX200, Nokia Open MSS
- MGW: Nokia IPA2800, Nokia Open MGW, Huawei UGW 9811, Huawei Cloud UGW
- HLR/HSS: Huawei HSS 9860
- USN (MME+SGSN): Huawei USN 9810, Huawei Cloud USN
- MME: Samsung MME DCP510C01
- vSPGW: Samsung vSPGW

and also generic specifications defined with the most important parameters only:

- |          |         |         |
|----------|---------|---------|
| ■ AAA    | ■ IWF   | ■ PPDB  |
| ■ ABSDB  | ■ LBS   | ■ RBT   |
| ■ CBC    | ■ LE    | ■ SBC   |
| ■ CNAP   | ■ M2MG  | ■ SCP   |
| ■ CSCF   | ■ MFCNS | ■ SG    |
| ■ CSGN   | ■ MGCF  | ■ SGW   |
| ■ EIR    | ■ MGW   | ■ SLDB  |
| ■ EPDG   | ■ MME   | ■ SLF   |
| ■ ESMLC  | ■ MPTCP | ■ SMP   |
| ■ GLR    | ■ MRF   | ■ SMSC  |
| ■ GMLC   | ■ NPDB  | ■ SMSGW |
| ■ H323GW | ■ NPMF  | ■ SPGW  |
| ■ HLR    | ■ OCS   | ■ SSW   |
| ■ HSGW   | ■ OFCS  | ■ STP   |
| ■ HSS    | ■ OTA   | ■ TAS   |
| ■ IBCF   | ■ PCF   | ■ TDB   |
| ■ IGW    | ■ PCRF  | ■ TG    |
| ■ IP     | ■ PDSN  | ■ VMS   |
| ■ IPS    | ■ PGW   | ■ VTGW  |
| ■ IVR    | ■ PNDB  |         |

The user can also, using **Resource Catalog** GUI, define its own network elements specifications or modify the pre-defined ones and, based on them, create core network elements in OSS Resource Inventory.



**Resource Catalog** is described in document: **ComarchOSS\_FD\_TMResourceCatalog.docx**

## 5.6.2 Generic MFC logical function modelling

All generic resource specifications of the **Mobile and Fixed Core** network elements have the following attributes defined:

Name	Label	Type	Mandatory	Description	Default value
<i>Backup</i>	Backup	Boolean	False	True if NE is used as disaster recovery platform.	
<i>globalTitle</i>	Global Title	String	False	Global Title	
<i>description</i>	Description	String	False	Description	
<i>hostname</i>	Hostname	String	False	FQDN for host name	
<i>inUse</i>	In Use	Boolean	False	True if NE is active	
<i>mcc</i>	MCC	String	False	Mobile Country Code	
<i>mnc</i>	MNC	String	False	Mobile Network Code	
<i>productRelease</i>	Product Release	String	False	Product Release	
<i>swVersion</i>	Software Version	String	False	Software Version	
<i>realm</i>	Realm	String	False	FQDN for network realm	
<i>technology</i>	Technology	String	False	2G, 3G, 4G, 5G, NB-IoT, VoIP, PSTN, UMC, IPTV	
<i>testbed</i>	Testbed	Boolean	False	Testbed platform	
<i>nmsName</i>	NMS Name	String	False	Name reported by the NMS	
<i>uri</i>	URL	Link	False	Link to the inventory resource	

Additionally, every resource specification of a network element can have a list of supported layers defined, which determines what trails can be terminated on the instance of the network element.

### 5.6.3 Creating MFC logical function (e.g. generic MSC)

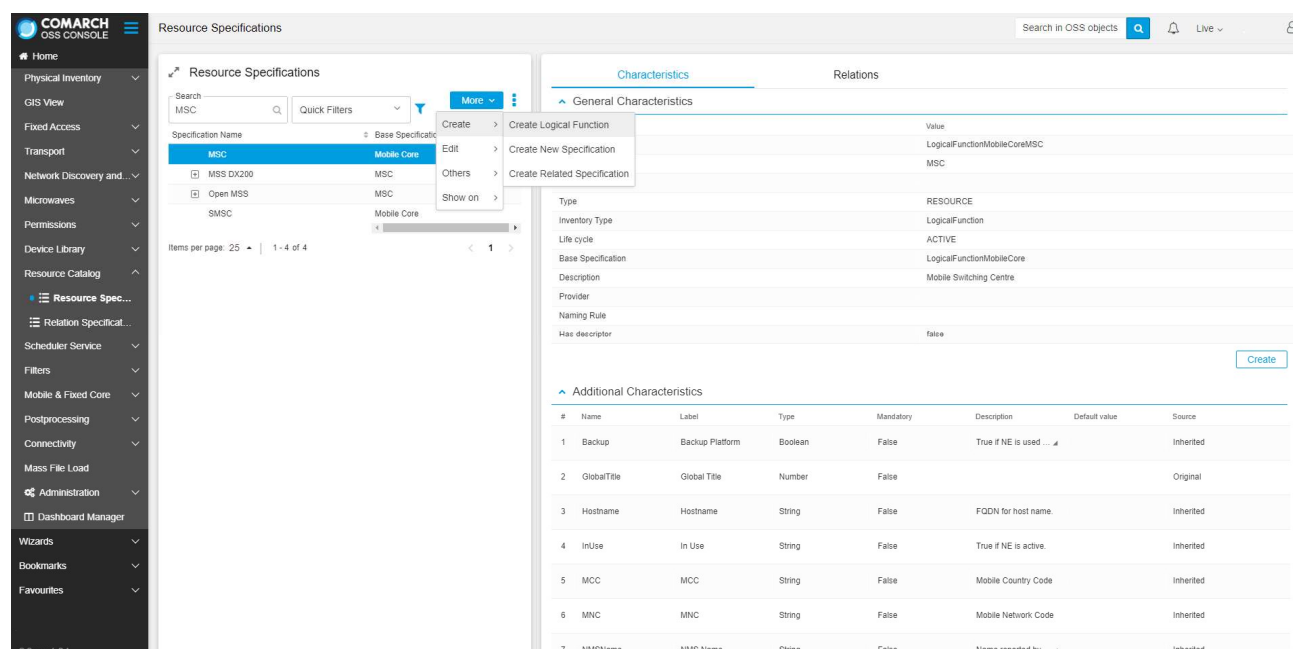


Figure 11 Creating MFC logical function based on Resource Catalog specification

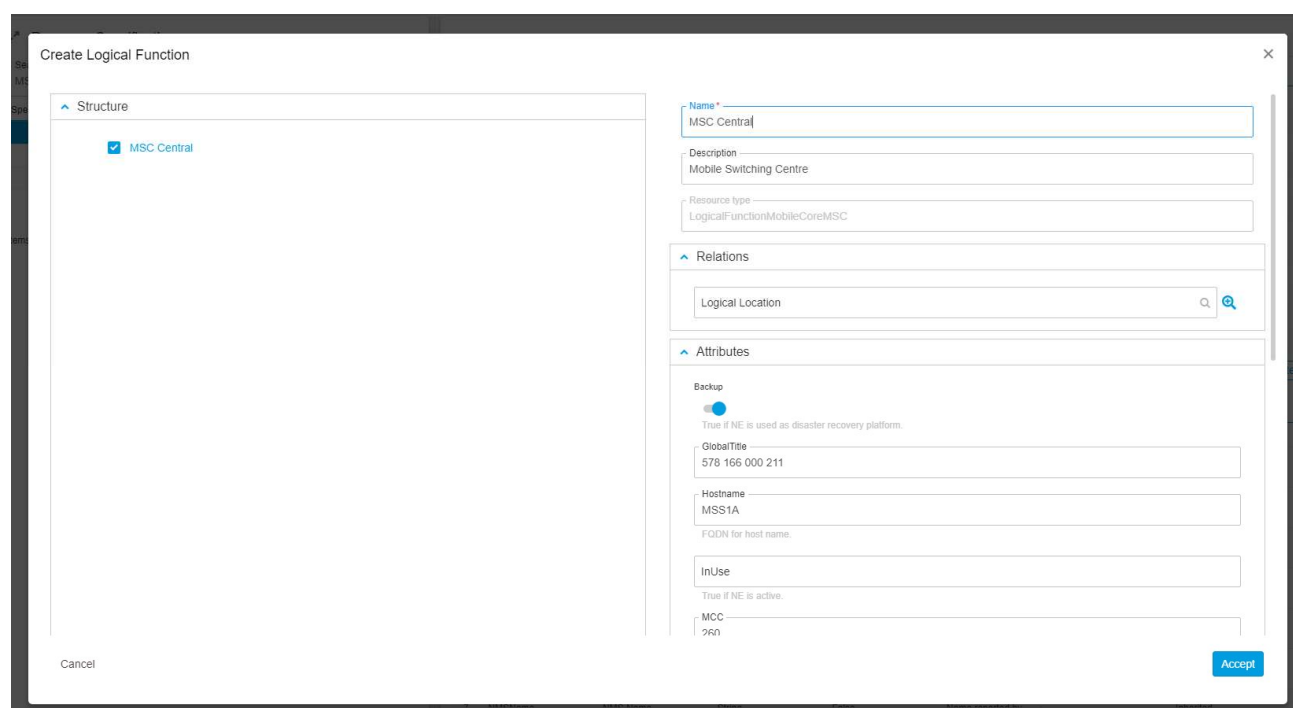


Figure 12 Creating MFC logical function – setting the attributes values

## 6 Cross domain Use Cases

### CDUC\_MFC\_INV\_1 – Browsing Vendor Specific MFC Objects

**Description** User can browse raw configuration data of MFC NE presented as VS objects

**Additional Description** After a correct RECO process, the user can browse configuration data from supported MFC NE.

[Home] -> [Views] -> [Network Discovery and Reconciliation] -> [VS Viewer]

The screenshot displays the 'VS Object Viewer' interface in the COMARCH OSS Console. The main panel shows a list of VS Objects with the following columns: Distinguish Name, Vendor, Type, CM Domain, and Adaptation. The list contains 20 items, all with Vendor 'nokia' and Type 'OSP'. The right panel shows the 'Attributes' section with a table of attributes and values.

Attribute	Value
ownSignallingPointHandling	STP
signallingPointCode	F
signallingPointCodeDecimal	15
signallingPointName	DXM53
spcSubfieldLengths	[14]
ss7Standard	ITU-T
version	M215.1P

**Reference to Documentation**

For further details see:  
**ComarchOSS\_Network\_Autodiscovery\_And\_Reconciliation\_Functional\_description**

## CDUC\_MFC\_INV\_1 – Browsing Vendor Specific MFC Objects

## Description

User can browse raw configuration data of MFC NE presented as VS objects

## Additional Description

After a correct RECO process, the user can browse configuration data from supported MFC NE.

[Home] -> [Views] -> [Network Discovery and Reconciliation] -> [VS Viewer]

The screenshot displays the 'VS Viewer' application within the 'COMARCH OSS CONSOLE'. The main window shows a table of 'VS Objects' with the following columns: Distinguished Name, Vendor, Type, Old Domain, and Adaptation. The table lists 42 objects, all of which are from the vendor 'nokia' and have a type of 'OSP'. The 'Old Domain' column contains links to the objects, and the 'Adaptation' column shows the adaptation name. The right-hand pane displays the 'Attributes' for the selected object, including: ownSignallingPointHandling (STP), signallingPointCode (F), signallingPointCodeDecimal (15), signallingPointName (DXMS3), spcSubfieldLengths ([14]), ss7Standard (ITU-T), and version (M616.11P).

## Reference to Documentation

For further details see: **ComarchOSS\_Network\_Autodiscovery\_And\_Reconciliation\_Funcional\_description**

## LIST OF FIGURES

Figure 1 MFC physical and logical inventory generic model .....	14
Figure 2 Interconnect, Global Title and Signalling Point Code model .....	15
Figure 3 MFC trails model .....	16
Figure 4 MFC logical functions .....	17
Figure 5 Creating Interconnect .....	22
Figure 6 Creating SPC – wizard .....	25
Figure 7 SPCs in Inventory View .....	25
Figure 8 Creating GT Address – wizard .....	28
Figure 9 Signalling Links.....	40
Figure 10 Signalling Link Set routed over Signalling Links .....	41
Figure 11 Creating MFC logical function based on Resource Catalog specification .....	44
Figure 12 Creating MFC logical function – setting the attributes values .....	44