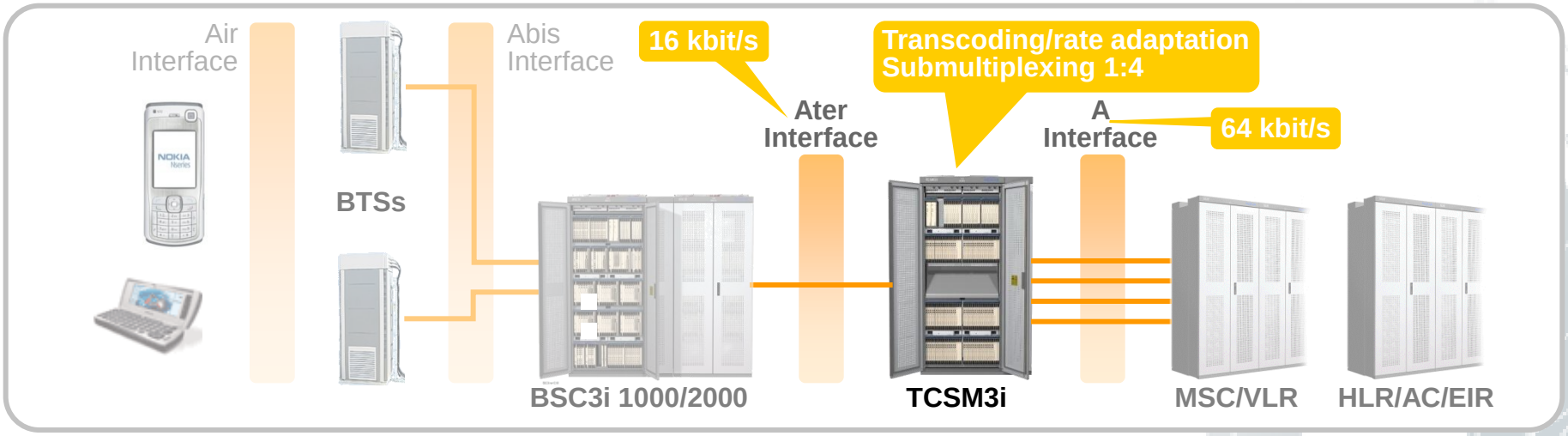
Nokia TCSM3i

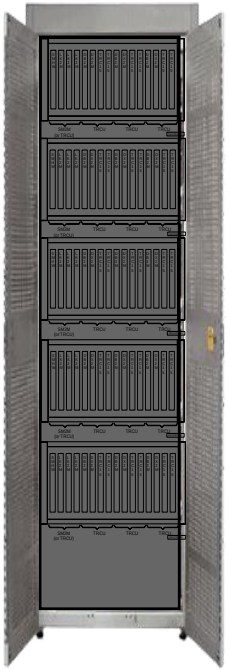
Transcoder function in GERAN

- 3GPP TS 08 series of Technical Specifications defines the A-interface between the BSS and Mobile Services switching Centre MSC
- A transcoder or rate adapter function is needed, because A-interface channel bit rate is 64 kbit/s, but the net radio path traffic channel is at a rate of less than 16 kbit/s
- Transcoding or rate adaptation function may be geographically situated at either the MSC site or the BSS site, however the transcoder is considered to be part of the BSS
- Submultiplexing can be utilized between BSC and transcoder for maximum transmission efficiency i.e. allocating as many as four 16 kbit/s channels to a single 64 kbit/s timeslot in the Ater PCM



Evolution path of Nokia TCSM Products

First generation



TCSME

- Up to 450 ETSI Ch
- Extension Step 15 ETSI

from 1992

Second generation

TCSM2E/A

- Up to 960 ETSI / 768 ANSI Ch
- Extension Step 120 ETSI / 95 ANSI
- Added unique features for superior voice quality – such as Acoustic Echo Canceller and Noise Suppression

from 1995

Third generation

TCSM3i

- Up to 11520 ETSI / 9120 ANSI Ch
- Extension Step 960 ETSI / 760 ANSI
- All TCSM2 features available
- Added enhanced pool options

from 2007

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Nokia TCSM3i High Capacity Transcoder Submultiplexer

- Capacity exceeding 11 000 traffic channels in compact one cabinet design
- High operational efficiency with minimal number of cabinets and low power consumption
- New configuration option as combined BSC3i 1000/2000 and TCSM3i site installation offer further benefits:
  - SDH/Sonet optical transmission connections towards A interface and remote BSCs
  - Sharing of TCSM3i resources between several BSCs (co-located or remote)
- All-in-one pool concept making reconfiguration work needless

Nokia TransCoder SubMultiplexer products TCSM3i & TCSM2 – Main features

- All-in-one triple codec: Full Rate; Half Rate, Enhanced Full Rate codec, TFO mode and AMR codecs
- Unique features for superior voice quality – such as Acoustic Echo Canceller and Nokia Noise Suppression
- Central supervision and configuration management via the BSC to Nokia NetActTM
  - Easy to operate remotely or locally on-line
  - Software is downloadable via BSC
- Terrestrial transmission cost minimised by 4:1 submultiplexed traffic channels

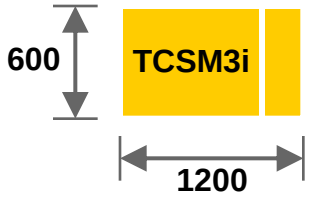
Nokia High Capacity TransCoder SubMultiplexer TCSM3i

In addition to TCSM2 features…

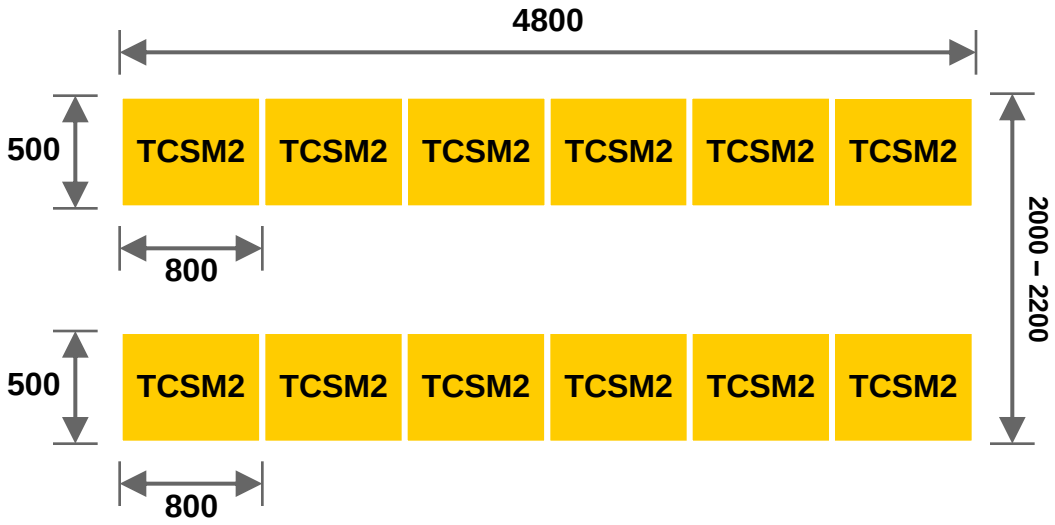
- Dynamic all-in-one pool support in new TCSM3i
  - Capability to support features flexible in the same pool
- Future proof solution
  - Smooth evolution capability for forthcoming functionalities according to BSS Release Roadmap
  - Easy upgrading for future transcoding improvements – software changes are included in BSC software package

Less floor space with TCSM3i

TCSM3i – 11520/9120 channel configuration



TCSM2 – 11520/9120 channel configuration



In this example TCSM2 occupies 13 or 15 times the floor space compared with TCSM3i

(depending whether the raised floor option is used or not)

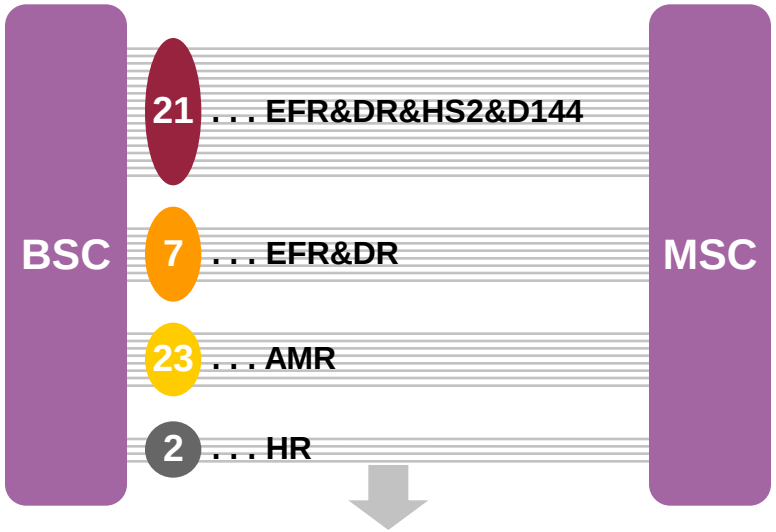
Even more when TCSM2s are installed with cabling racks

Support for new enhanced A-Interface pools

All supported codecs and features in the same pool

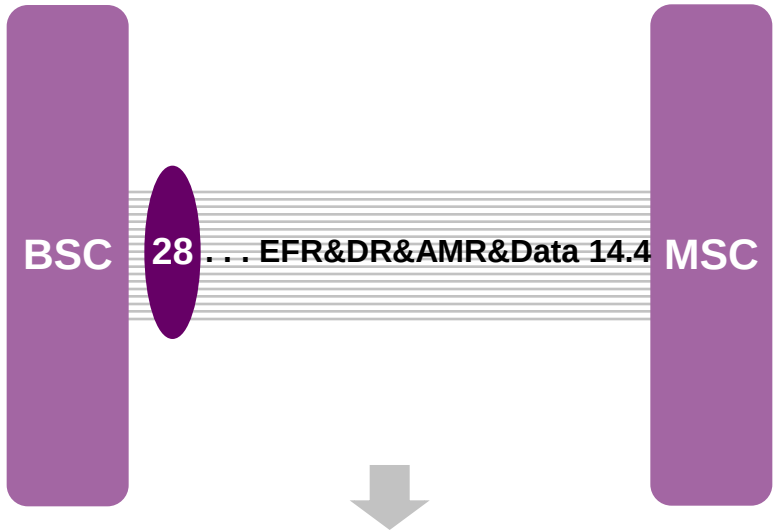
- New pools introduced in TCSM3i only
  - Pool 28 (EFR&DR&AMR&Data 14.4)
  - Pool 32 (EFR&DR&AMR&HS4&Data 14.4)

Example of TCSM2 – A-Interface



Supported codecs and features
in separate pools

Example of TCSM3i – A-Interface



All supported codecs and features
in the same pool

TCSM3i installation options

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Nokia TCSM3i Installation Options

TCSM3i in stand-alone installation

- Similar implementation as with TCSM2
- E1/T1 connections towards A- and Ater –interfaces (480 E1/T1 lines)
- Up to 11 520 ch capacity in ETSI, 9120 ch in ANSI
- Cabling Cabinet
- Typical location at core site, can serve up to 12 remote BSCs

TCSM3i in combined BSC3i/TCSM3i installation

- New installation option
- Provides STM-1/OC-3 connections towards A –interface (6 STM-1/OC-3 lines)
- Up to 11 358 ch capacity in ETSI, 11424 ch in ANSI
- No cabling cabinet
- Typical location at core site, can serve 96 BSCs in ETSI or 24 in ANSI

Combined BSC3i/TCSM3i cabinet configurations

BSC3i 1000 + TCSM3i

TCSM3i cabinet can be flexibly configured on either side of BSC3i 1000 (one cabinet) or BSC3i 2000 (two cabinets)

TCSM3i + BSC3i 1000

BSC3i 2000 + TCSM3i

TCSM3i + BSC3i 2000

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STM-1/OC-3 in Nokia TCSM3i with combined BSC3i/TCSM3i Installation Option

- Combined BSC3i/TCSM3i installation provides optical STM-1/OC-3 interface towards CS core
  - Simplified cabling with integrated STM-1/OC-3 interfaces
  - No need for transmission plug-in units for Ater connections
  - Fast A-interface installation with optical connections
- Clear savings in transmission and site costs
  - No need for Cabling Cabinets in either BSC3i or TCSM3i
  - No need for external transmission elements (E1/T1 – SDH/SONET converters or DDFs)
  - Reduced power consumption per traffic channel

Transcoding Capacity

11358 ch ETSI in steps of 960/933 ch

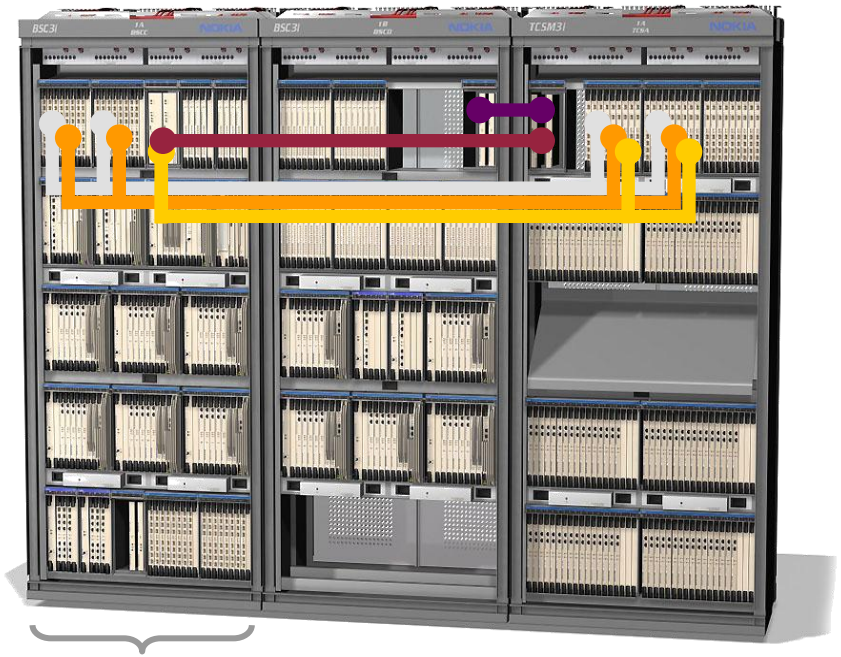
11424 ch ANSI in steps of 952 ch

Connectivity

96 BSCs in ETSI / 24 BSCs in ANSI

Combined BSC3i/TCSM3i Installation – Internal cabling

- Supervision Bus
- Timing Bus
- Ater-interface
  4 x 655.36 Mbit/s
  Hotlink
- ETS2 control
  8 x 8 Mbit/s
  Internal PCM
- Synchronisation
  cables 0 - 3



Note: All interconnection wiring is shielded twisted pair copper cables

Combined BSC3i/TCSM3i Installation

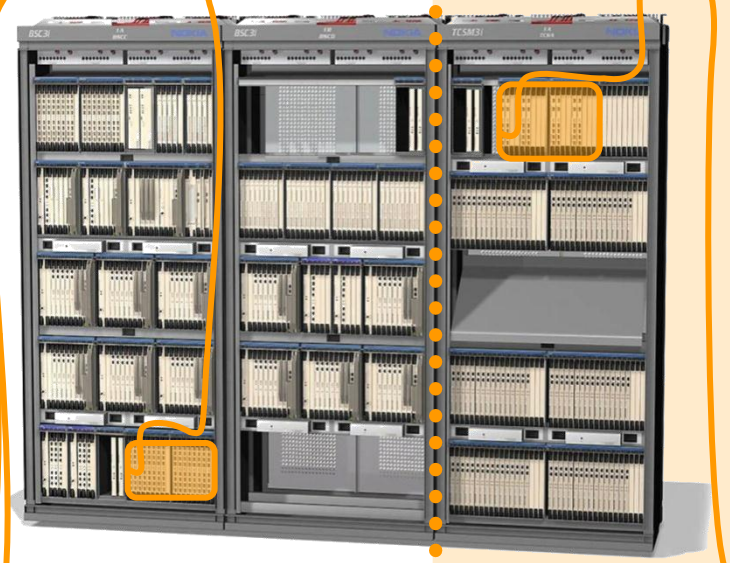
External Interfaces example

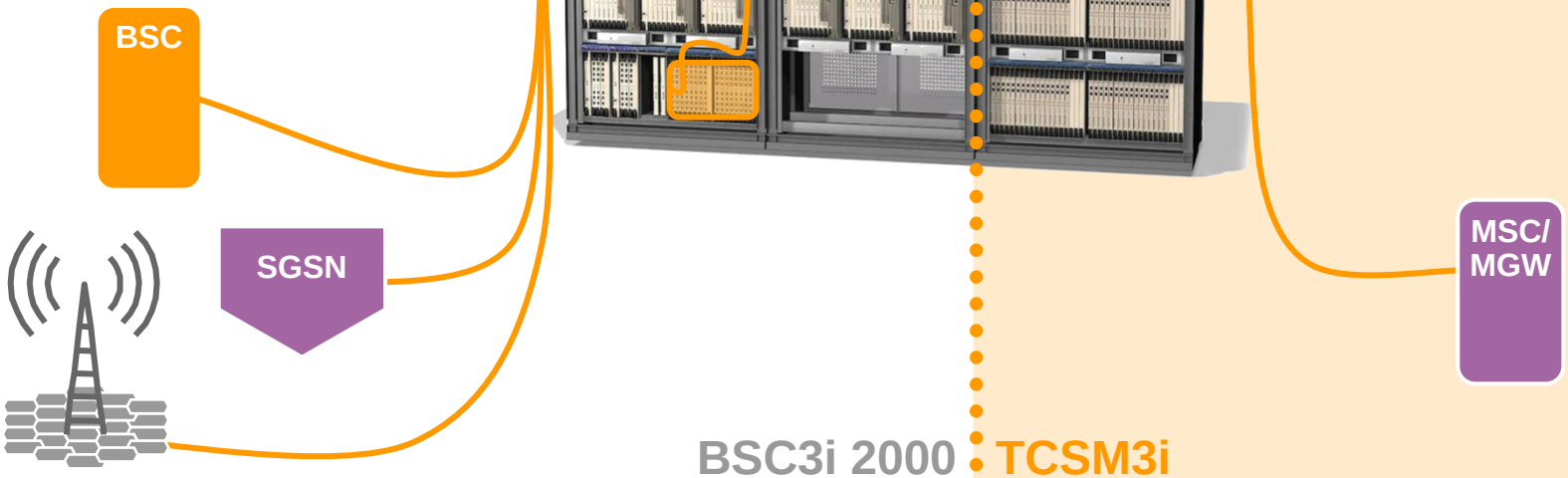
Abis-, Ater-, Gb-interface

- ETS2 plug-in units in the BSC3i provide connection to radio- and packet core network
- Maximum of 16 STM-1/OC-3 interfaces is available

A-interface

- 4 ETS2 plug-in units in TCSM3i provide connection to core network
- Maximum of 6 STM-1/OC-3 interfaces is available





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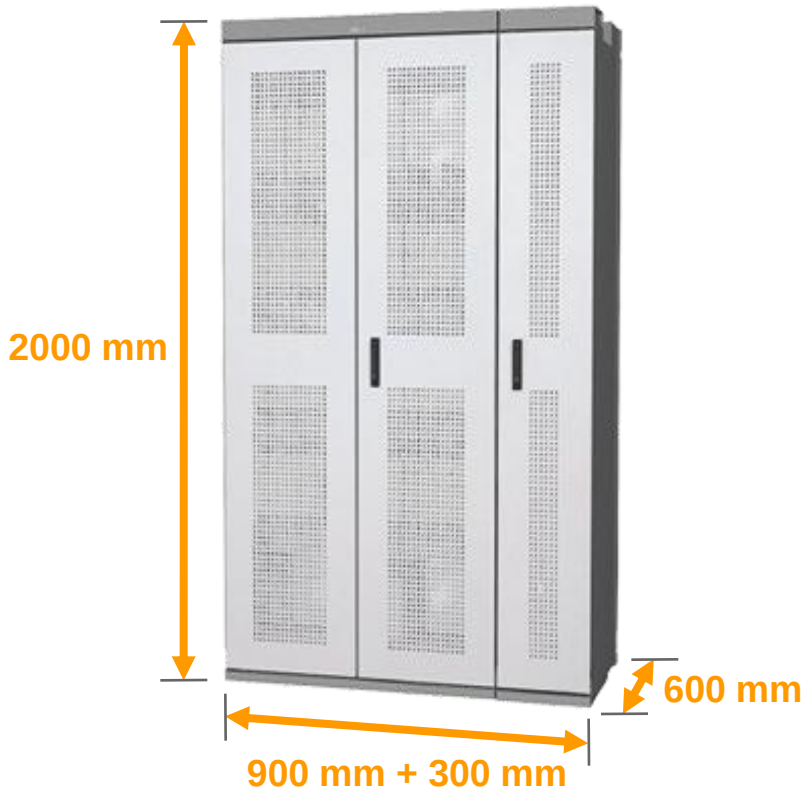
TCSM3i hardware

TCSM3i Cabinet

- Fast installation time on site and very easy expansion
- Simplified cabling with cabling cabinet for E1/T1 connections
- Both overhead cable as well as raised-floor options supported
- Dimensioned according to international standards
- Enhanced earthquake and fire resistance

TCSM3i Cabinet

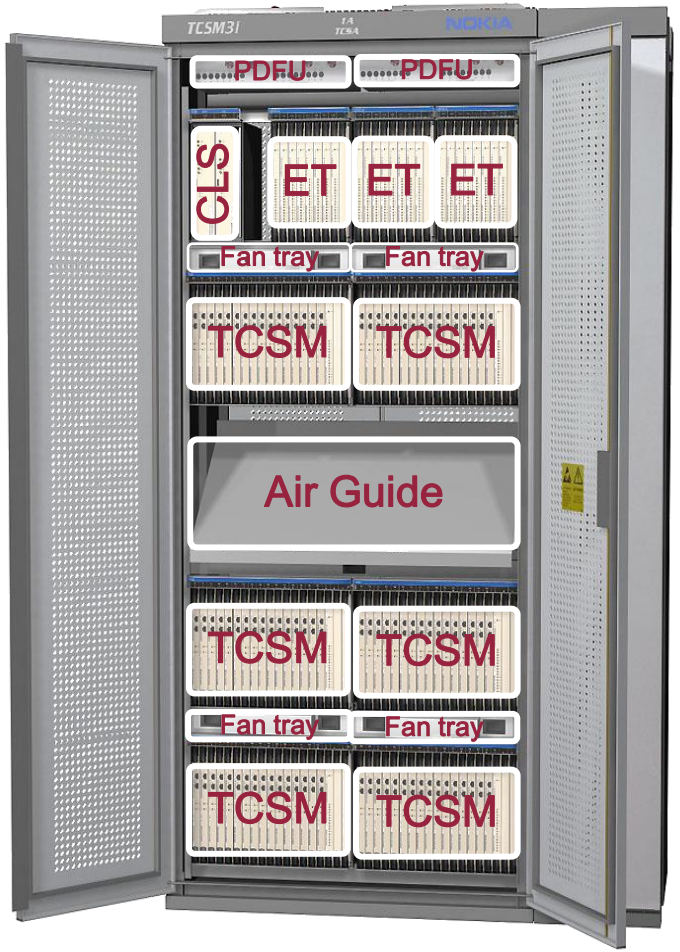


TCSM3i Cabinet configuration

Functional units

- TCSM – TransCoder SubMultiplexer (6 TC2C cartridges)
- ET – Exchange Terminal (3 ETC cartridges)
- CLS – Clock & Synchronization Unit (CLOC cartridge)
- PDFU – Power Distribution Fuse Unit

Common platform mechanics with Nokia BSC3i 1000/2000, MSS, MSCi, HLRi and 2G SGSN



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TCSM3i hardware

CLOC cartridge

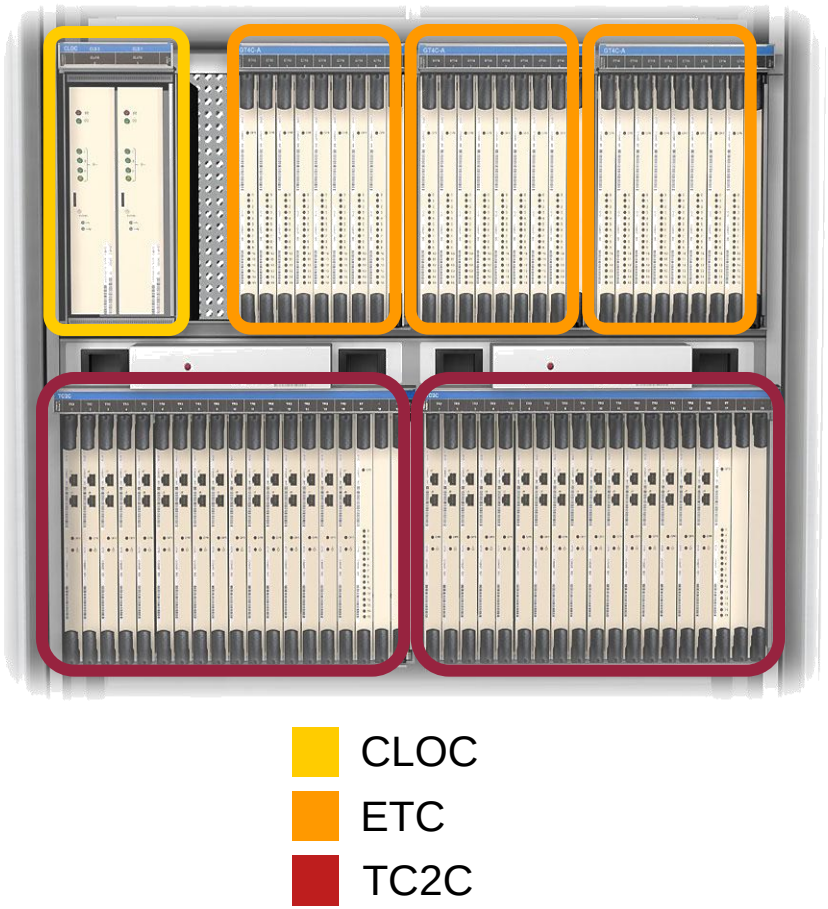
- 2 Clock and Tone Generator (CL3TG) plug-in units

ETC cartridge

- 8 Exchange Terminal (ET16) plug-in units for A-interface
  - Same unit for ETSI/ANSI
  - 16 back-mounted E1/T1 connections
  - External connections by RJ45 plugs

TC2C cartridge

- 16 Transcoding plug-in units
  - TR3E for ETSI 120 ch
  - TR3A for ANSI 95 ch
- 1 or 2 Ater interface ET16 plug-in units



TCSM3i for combined BSC3i/TCSM3i Cabinet configuration

Functional units

- TCSM – TransCoder SubMultiplexer (6 TC2C cartridges)
- SET – SDH/SONET Exchange Terminal (2 GTIC cartridges)
- CLAB – Clock and Alarm Buffer Unit (CLAC cartridge)
- PDFU – Power Distribution Fuse Unit

TCSM3i can be installed on either side of the BSC3i 1000/2000 configurations

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TCSM3i for combined BSC3i/TCSM3i installation Hardware

CLAC cartridge

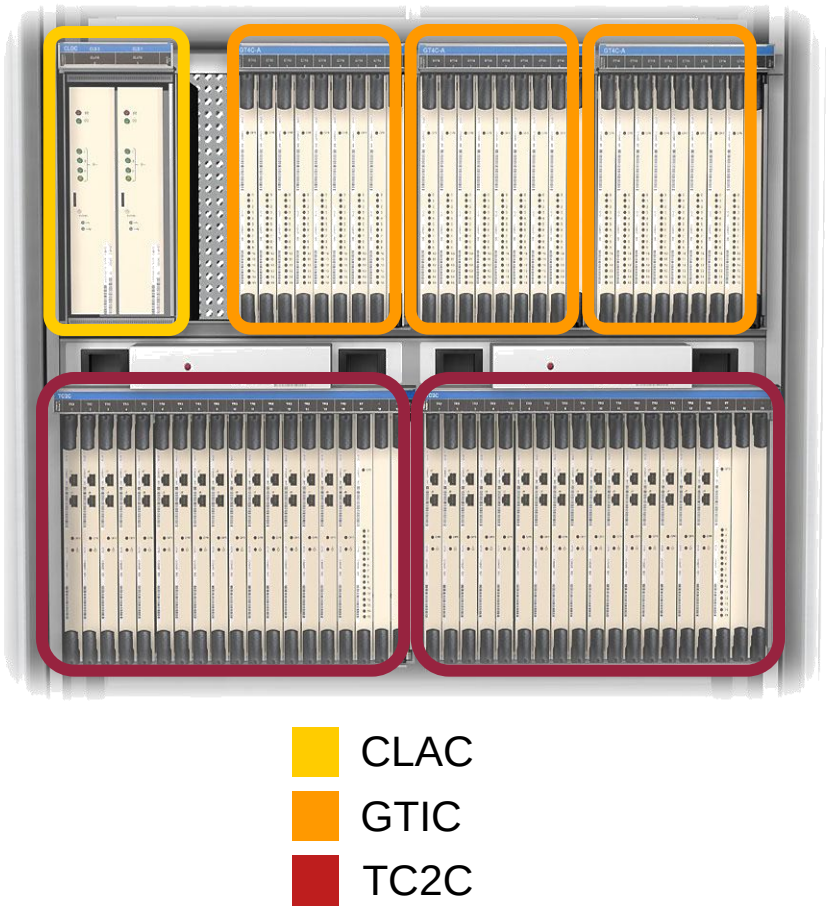
- 2 Clock and Alarm Buffer (CLAB) plug-in units

GTIC cartridges

- 2 A-interface SDH/SONET Exchange Terminal (ETS2) plug-in units
  - Same unit for ETSI/ANSI
  - 2 STM-1/OC-3 connections per unit
  - Optical LC-connectors at front plate
- 2 Serial Broadband Multiplexer (SBMUX) for internal Ater connections

TC2C cartridges

- 16 Transcoding plug-in units
  - TR3E for both ETSI and ANSI



TCSM3i hardware configurations

TCSM3i hardware configurations
Capacity steps

Capacity

- 11520 / 9120 Ch per cabinet
- In steps of 960 / 760 Ch

Connectivity

- Up to 6 BSCs standard
- Up to 12 BSCs optional (*

Configuration

- Transcoding Units
- Exchange Terminal Units A-interface
- Exchange Terminal Units Ater-interface
- Modular extension of capacity with smooth upgrade path

***)** Second ET16 required in transcoding cartridges

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Distributing the capacity for different BSCs

Connectivity

- Up to 6 BSCs standard
- Up to 12 BSCs optional (*

Configuration example

1. 960/760 channels for BSC #1
   - 8 TR3E/A equipped to TC2C 0 slots 1 – 8
   - TC2C 0 slot 1 must always be equipped, because that TR3E/A controls the CLS unit
   - TR3E/A in slot 2 controls the Ater-interface ET16 unit equipped in TC2C 0
2. 1920/1520 channels for BSC #1
   - Add 8 TR3E/A in TC2C 1 slots 9 – 16
3. 960/760 channels for BSC #2
   - Add 8 TR3E/A in TC2C 2 slots 1 – 8
4. 960/760 channels for BSC #3
   - 8 TR3E/A in TC2C 1 slots 9 – 16
   - Second Ater ET16 equipped into slot 18
   - TR3E/A in slot 9 controls the second ET16 unit
5. etc.

***)** Second ET16 required in transcoding cartridges

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TCSM3i for combined BSC3i/TCSM3i installation Capacity steps

Capacity

- 11358 / 11424 Ch per cabinet
- In steps of 960,933 / 952 Ch

Connectivity

- Up to 96 BSCs ETSI
- Up to 24 BSCs ANSI

Configuration

- Transcoding Units
- SDH/SONET ET Units in A-interface
- Modular extension of capacity with smooth upgrade path

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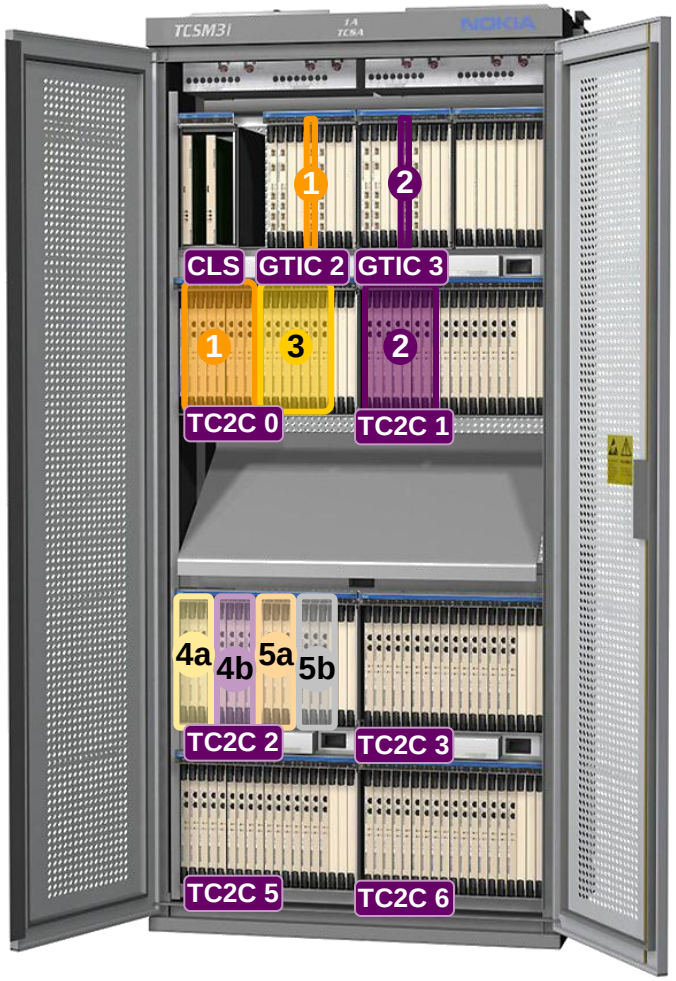
Distributing the capacity for different BSCs

Connectivity

- Up to 96 BSCs ETSI
- Up to 24 BSCs ANSI

Configuration example

1. 960/952 channels for BSC #1
   - 8 TR3E/A equipped to TC2C 0 slots 1 – 8
   - 1 ETS2 quipped in GTIC 2 slot 5
2. 960/952 channels for BSC #2
   - 8 TR3E in TC2C 1 slots 1 – 8
   - 1 ETS2 quipped in GTIC 3 slot 5
3. 933/952 channels for BSC #3
   - 8 TR3E equipped in TC2C 0 slots 9 – 16
4. 960/952 channels split in two
   a) 480/476 channels for BSC #4
   b) 480/476 channels for BSC #5
5. 933/952 channels split in two
   a) 480/476 channels for BSC #6
   b) 453/476 channels for BSC #7



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Nokia TCSM3i technical specifications

Maximum capacity of TCSM3i3	**ANSI** **ETSI**	9120 ch 11520 ch	(11424 ch) * (11358 ch)
Maximum number of BSCs connected	**ANSI** **ETSI**	12 pcs 12 pcs	(24 pcs) (96 pcs)
Maximum number of ext. interfaces	**A** **Ater**	384 T1/E1 96 T1/E1	(6 OC-3/STM-1) (internal wiring)
Weight		Maximum weight 320 kg, cabling cabinet 75 kg floor loading below 500 kg/m2, no need for raised floor	
Dimensions (H x W x D) **Footprint** **cm2/channel**		2000x1200x600 mm 6' 7" x 3' 11" x 2' 0.72 m^2 0.63 cm^2/ch	(2000x900x600 mm) (6' 7" x 2' 11" x 2') (0.54 m2) 0.79 ANSI (0.53 cm2/ch)
Power supply		Inputs –48 or –60 V dc (ETS 300 132-2) Direct floating batteries can be used	
Power consumption **for dimensioning site power** **supplymaximum operating**		0.14 W/ch 3.0 kW 1.6 kW	(0.13 W/ch) (2.8 kW) 1.3 kW ANSI (1.5 kW)
Environment		Safety: EN 60950 and UL 60950 Fire resistance: GR63CORE & TP76200MP Earthquake resistance: ETS 300 019 & GR63CORE Environmental requirements: ETS 300 019-1-3 EMC specifications: EN 300386-2 & FCC part 15 Acoustic noise: ETS 300 753 & GR63CORE Restriction of Hazardous Substances: EU 2002/95/EC (RoHS) Product collection and disposal: EU 2002/96/EC (WEEE)	

***)** TCSM3i for combined BSC3i/TCSM3i installation

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THANK YOU

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