TCU (traffic control unit)

OVERVIEW ,CONFIGURATION & Integration

AGENDA

- TCU 2 Overview
- TCU 2 Configuration
- TCU 2 Integration

TCU Overview

- The Site Transport Node (STN) is a node in the Base Station System (BSS), this is the TCU logical name, that handle & provides a common interface between RBS (GSM, WCDMA, CDMA, LTE, single or multi-standard, legacy or 3rd party equipment), and IP/Ethernet over IP over E1/T1 transport networks.
- The TCU 02 (Transport Connectivity Unit) is a component in the RBS 6000 product family and has been designed primarily to support Multi Standard RBS with advanced transport functionality.

TCU 2

HW TCU 02 – GA Dec 2011

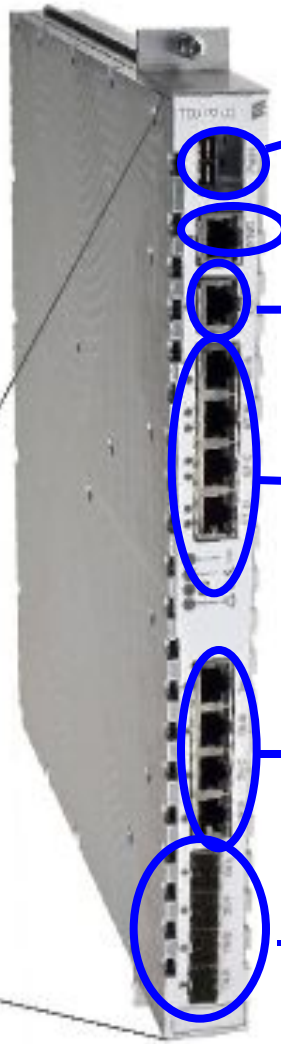
Large volumes (Nx100K)

Capacity optimized for MSR

Integrated in all RBS 6000
(slot 31mm wide & 300mm high)

- No FAN
- 8 E1/T1 ports
- 4 Ethernet 100/1000 Base-T ports
- 4 Ethernet 100/1000 SFP ports
- One clock ports

Oscillator



Power -48 DC

Clock Port (SNC)

Local management Port

8 E1s Ports: Connect 2G RBSs or to transmission network with ML-PPP

4 RJ45 Ethernet ports

- **4 SPF Ethernet ports**
- Multipurpose use: Connected to 4 of the RJ45 ports, the configuration decides which one use.

SW TCU 02

- Abis over IP
- Abis optimization
- NTP, PTP client, Sync E
- Ethernet Bridging
- Performance monitoring
- Ethernet OAM
- Routing Ethernet & MLPPP (E1/T1)
  - IPv4 Bi-directional forwarding Detection
  - Policy based routing

TCU Overview

› What does the TCU do?

In the downlink direction, STN unpacks the IP packets received on the Ethernet interface. The contained LAPD packets are sent to the BTS using the super channel.

In the uplink direction, LAPD frames from the BTS are received on the super channel in LAPD format. The LAPD frames from the super channels are sorted according to traffic types. Traffic types configured by the operator to be bundled together are sent to the same bundling process and packed together into the same IP packet and sent to the BSC/PGW.

TCU Overview

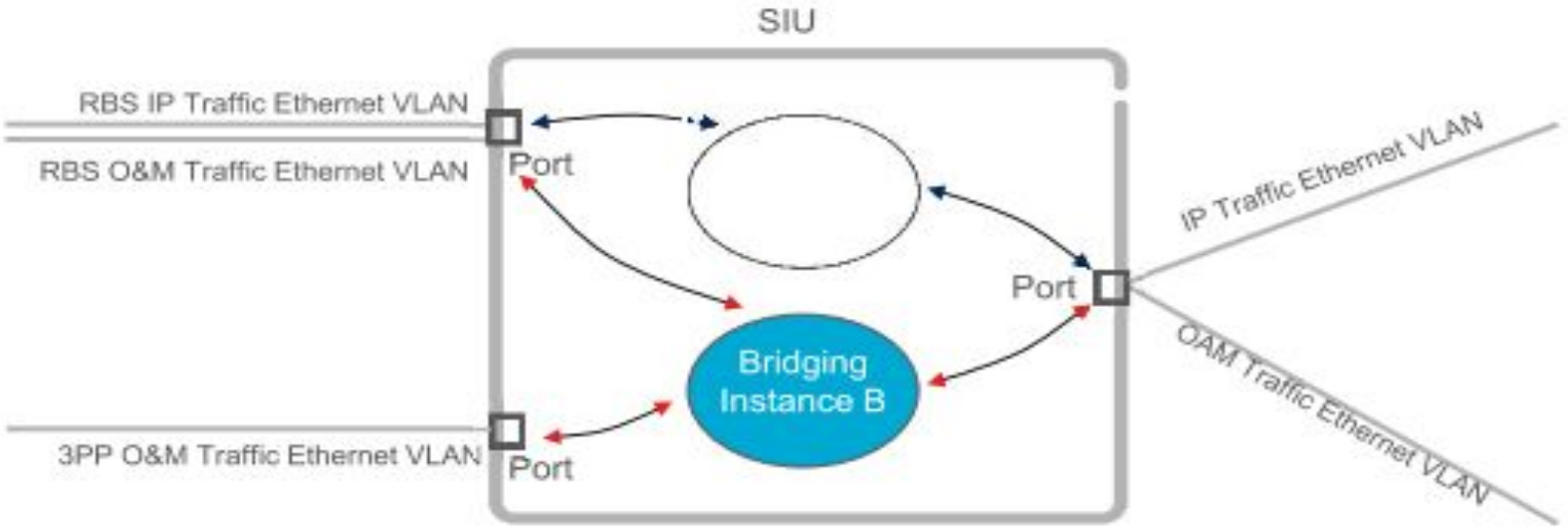
- The feature Abis over IP makes it possible for the operators to use an IP infrastructure for the transmission of signaling and payload between BSC and BTS.
- The Packet Gateway, PGW, is used to terminate IP on the BSC side. Other BTS side, IP is terminated in the Site Transport Node for RBS, STN.
- The IP network between the PGW in the BSC and the STN in the BTS uses IPv4. For Abis over IP, the SC concept is only a model in the PGW, the real super channels only exists between the STN and the BTS. The whole PCM link constitutes a super channel. Similarly to the Digital Paths, there are four SCs with fixed size of 31 timeslots possible to use per TG. There exist a fixed relationship between TRXs and SCs, one TRX cannot transmit over different SCs. The SCs going to one TG are grouped in one Super Channel Group (SCGR).

TCU Overview

- Using IP transport on the Abis interface the operator can substantially lower the cost for operation and maintenance of transport networks. IP networks also give a more cost effective transmission compared to E1/T1 based transmission.
- The PGW handles the speech, GPRS/EGPRS and the signaling in the same piece of hardware. The PGW can handles a mix of IP based Abis transmission and E1/T1 based Abis transmission. Each TG can only use one type of transmission mode.
- To support QoS handling, it is possible to put different codes on different traffic types.
- BSC supports upto 64 PGW RPs.
- The amount of traffic one PGW can handle depends on network configuration and traffic load. One PGW can support upto 127 TRXs and upto 500 Erlang with a traffic load according to the traffic model.
- Cascaded sites are not supported.

Ethernet bridging

› Enables transparent bridging at RBS site



- All Ethernet ports support the bridging feature
- Option to configure multiple instances on bridging
- Option to configure both routing and bridging instances simultaneously
- Supports both tagged and untagged VLAN ID
- Option to define PCP (P-bit) marking for untagged frames
- Option to use PCP or DSCP for Traffic Management Scheduling

Access TCU

- Connect TCU via Local Management Terminal
- RJ45 conector to Local Management port

- telnet 192.168.1.1/24
- username: admin
- password: hidden

- *TCU prompt: OSmon>*

Basic Command

- List *available* commands:
- *OSmon> help*

- *Print the log with complete configuration:*
- *OSmon> syslog read -s system*
- *OSmon> syslog read -s event*
- *OSmon> syslog read -s messages*
- List all active alarms in the TCU
- *OSmon>getalarmlist*

- Print uptime for the system:
- OSmon> uptime

- Reset to default factory setting, all configuration will be erased
- *OSmon>ResetToFactorySetting*

Basic Command

- List MO instances in a specific MO containment hierarchy under and including the baseObjectInstance .

Eg.

- >getContainmentt1 STN=0
- >STN=0;
- >STN=0,Equipment=0;
- >STN=0,EthernetInterface=0;
- >STN=0,IPInterface=0;
- >STN=0,Synchronization=0;
- >STN=0,MeasurementDefinition=0;
- >STN=0,E1T1Interface=0;
- >STN=0,TGTransport=p2;
- >STN=0,TGTransport=p2,SuperChannel=0;
- >OperationSucceeded

Basic Command

- Displays Managed Object (MO) attribute values
- *Eg* *OSmon> getmoattribute stn=0,e1t1interface=0*
  - *STN=0,E1T1Interface=0; instanceId= 0;*
  - *STN=0,E1T1Interface=0; operationalState= disabled;*
  - *STN=0,E1T1Interface=0; type= E1;*
  - *STN=0,E1T1Interface=0; transmitClockSource= localTiming;*
  - *STN=0,E1T1Interface=0; receiveClockSource= notUsed;*
  - *STN=0,E1T1Interface=0; loopbackMode= off;*
  - *OperationSucceeded*

Basic Command

- To execute configuration commands via CLI (command line interface) is needed to do it within a transaction
- *Eg*
- *>starttransaction s1*
- *>setMOAttribute s1 …*
- *>…*
- *>Checkconsistency s1*
- *>commit s1*
- *>endtransaction s1*

SW release for TCU

TCU 02			
Release version	Product number	R-state	Release date
T12A	CXP 102 134/2	R1Z (R1Z08)	16-Dec-11

TCU Configuration

- Attaching Local Terminal O&M
- Resetting Configuration
- Set Time for TCU
- Start basic CM Transaction
- Set Unique Name for TCU
- Configuring WAN & VLAN
- Configuring IP interface Traffic & OAM
- Configuring Routing Table for IP Interface Traffic
- Configuring OSS Registration for TCU
- Configuring Time Reference for TCU
- Configuring Synchronization for TCU
- Configuring E1/T1
- Configuring TG Transport and Super Channel
- Configuring QoS Mapping Policy
- Finishing Configuration TCU
- Getting TCU logs

Basic trouble shooting knowledge: LED indicators

- **Power – Green color.**
  - On, TCU has power
  - Off, TCU has no power
- **Fault – Red color.**
  - On, Major alarms detected.
  - Off, No faults detected.
- **Operational – Green color.**
  - On, TCU is operational.
  - Flashing 10 Hz, active SSH or SFTP session.
  - Flashing 0.5 Hz, TCU powered but not operational.
  - Off, TCU no powered.
- **Information – Yellow color.**
  - On, Minor alarm detected.
  - Off, No faults detected.
- **Synchronized – Green color.**
  - On, TCU provides sufficient timing to RBSs for RF generation.
  - Off, Timing provided by TCU cannot be used for RF generation

TCU Configuration

Resetting Configuration

To reset the STN configuration to default values, do the following:

Command: **resettofactorysetting**

This command resets the TCU to default factory setting. MIB content is erased and persistent data including security and synchronization data is cleared. Software archives are not affected by this command.

The STN restart takes a few minutes.

TCU Configuration

Set Time for TCU

Example:

settime Year(1970->) Mon(1-12) Day(1-31) Hour(0-23) Min(0-59) Sec(0-59) Msec(0-999)
settime 2011 6 15 24 00 00 000

TCU Configuration

Start basic CM Transaction

Example:

starttransaction asdf

Name of the transaction can be changed with unique name eg:; 1,2,3,asdf,t1 etc

TCU Configuration

Set the Unique Name (maximum 18 characters) for TCU

Example:

setmoattribute asdf STN=0 stn_name TCURBR0073

TCU Configuration

Configuring WAN & VLAN

Example:

```
createmo asdf STN=0,EthernetInterface=WAN
setmoattribute asdf STN=0,EthernetInterface=WAN port WANFastEthernet
setmoattribute asdf STN=0,EthernetInterface=WAN mode AUTO
setmoattribute asdf STN=0,EthernetInterface=WAN portNumber 0
setmoattribute asdf STN=0,EthernetInterface=WAN sendLinkAlarmAllowed true

createmo asdf STN=0,VLANGroup=WAN
setmoattribute asdf STN=0,VLANGroup=WAN depLinkLayer STN=0,EthernetInterface=WAN

createmo asdf STN=0,VLANGroup=WAN,VLAN=2G
setmoattribute asdf STN=0,VLANGroup=WAN,VLAN=2G tagValue 3172          !VLAN ABIS!
setmoattribute asdf STN=0,VLANGroup=WAN,VLAN=2G tagged true

createmo asdf STN=0,VLANGroup=WAN,VLAN=OM
setmoattribute asdf STN=0,VLANGroup=WAN,VLAN=OM tagValue 3122          !VLAN OM!
setmoattribute asdf STN=0,VLANGroup=WAN,VLAN=OM tagged true
```

TCU Configuration

Configuring IP interface Traffic & OAM

Example:

```
createmo asdf STN=0,IPInterface=2G
setmoattribute asdf STN=0,IPInterface=2G primaryIP_Address 10.235.1.204              !IP address ABIS!
setmoattribute asdf STN=0,IPInterface=2G primarySubNetMask 255.255.255.240                  !Netmask ABIS!
setmoattribute asdf STN=0,IPInterface=2G depLinkLayer STN=0,VLANGroup=WAN,VLAN=2G
setmoattribute asdf STN=0,IPInterface=2G trustDSCP true

createmo asdf STN=0,IPInterface=OM
setmoattribute asdf STN=0,IPInterface=OM primaryIP_Address 10.234.1.204              !IP address OM!
setmoattribute asdf STN=0,IPInterface=OM primarySubNetMask 255.255.255.240                  !Netmask OM!
setmoattribute asdf STN=0,IPInterface=OM defaultGateway 10.234.1.193              !Default gateway OM!
setmoattribute asdf STN=0,IPInterface=OM depLinkLayer STN=0,VLANGroup=WAN,VLAN=OM
setmoattribute asdf STN=0,IPInterface=OM trustDSCP true

setmoattribute asdf STN=0 depIP_interface stn=0,ipinterface=OM
```

TCU Configuration

Configuring Routing Table for IP Interface Traffic

Example:

```
createmo asdf STN=0,RoutingTable=0,IPRoute=2G
setmoattribute asdf STN=0,RoutingTable=0,IPRoute=2G forwardingInterface STN=0,IPInterface=2G
setmoattribute asdf STN=0,RoutingTable=0,IPRoute=2G nextHopIpAddress 10.235.1.193    !Default gateway ABIS!
setmoattribute asdf STN=0,RoutingTable=0,IPRoute=2G destIpSubnet 10.235.0.128/26       !destIpSubnet PGW!
setmoattribute asdf STN=0,RoutingTable=0,IpRoute=2G admDistance 2

createmo asdf STN=0,RoutingTable=0,IPRoute=NWIE
setmoattribute asdf STN=0,RoutingTable=0,IpRoute=NWIE forwardingInterface STN=0,IPInterface=2G
setmoattribute asdf STN=0,RoutingTable=0,IpRoute=NWIE nextHopIpAddress 10.235.1.193  !Default gw ABIS!
setmoattribute asdf STN=0,RoutingTable=0,IpRoute=NWIE destIpSubnet 10.235.0.0/25        !destIpSubnet NWIE!
setmoattribute asdf STN=0,RoutingTable=0,IpRoute=NWIE admDistance 3
```

TCU Configuration

Configuring OSS Registration for TCU

Set wake-up registration to OSS, the OSS IP address is used.

Example:
setmoattribute asdf STN=0 wakeupregistration 10.224.16.4 !IP Address OSS!

Configure SNMP to IP address OSS

Example:
subscribe 10.224.16.4 3 !Configure SNMP to IP Address OSS!

TCU Configuration

Configuring Time Reference for TCU

Example:

setmoattribute asdf STN=0 systemClockTimeServer 192.168.1.25 !IP Address NTP Server!
setmoattribute asdf STN=0 systemClockTimeServerType NTP
setmoattribute asdf STN=0 STN_systemClockUDP_Port 123

TCU Configuration

Configuring Synchronization for TCU

Example:

```
setmoattribute asdf STN=0,synchronization=0 synchType timeServer
setmoattribute asdf STN=0,synchronization=0 DSCP_synchronization 48     !DSCP for Synchronization!
setmoattribute asdf STN=0,synchronization=0 depIP_interface stn=0,ipinterface=OM

createmo asdf STN=0,synchronization=0,Timeserver=TS1
setmoattribute asdf STN=0,synchronization=0,Timeserver=TS1 timeServerType NTP
setmoattribute asdf STN=0,synchronization=0,Timeserver=TS1 STN_TS_UDP_Port 123
setmoattribute asdf STN=0,synchronization=0,Timeserver=TS1 TS_IP_Address 192.168.1.25       !IP
   Address NTP Server!
setmoattribute asdf STN=0,synchronization=0,Timeserver=TS1 TS_Priority 1          !Pbit for NTP Sync!
```

TCU Configuration

Configuring E1/T1

Example:

E1/T1 port 1

```
createmo asdf STN=0,E1T1Interface=0
setmoattribute asdf STN=0,E1T1Interface=0 type E1
createmo asdf STN=0,E1T1Interface=1
setmoattribute asdf STN=0,E1T1Interface=1 type E1
```

E1/T1 port 2

```
createmo asdf STN=0,E1T1Interface=2
setmoattribute asdf STN=0,E1T1Interface=2 type E1
createmo asdf STN=0,E1T1Interface=3
setmoattribute asdf STN=0,E1T1Interface=3 type E1
```

TCU Configuration

Configuring TG Transport and Super Channel

Example:
TG Transport for E1/T1 port1

```
createmo asdf STN=0,TGTransport=RBR0073_TG0153
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0153 depIP_interface stn=0,ipinterface=2G
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0153 pgw_ip_address 10.235.0.131       !IP Address pool PGW!
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0153 DSCP_L2TP_CP 48                    !DSCP for L2TP_CP!

createmo asdf STN=0,TGTransport=RBR0073_TG0153,SuperChannel=0
createmo asdf STN=0,TGTransport=RBR0073_TG0153,SuperChannel=1

setmoattribute asdf STN=0,TGTransport=RBR0073_TG0153,SuperChannel=0 depE1T1Interface 0
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0153,SuperChannel=1 depE1T1Interface 1
```

TCU Configuration

TG Transport for E1/T1 port2

```
createmo asdf STN=0,TGTransport=RBR0073_TG0154
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0154 depIP_interface stn=0,ipinterface=2G
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0154 pgw_ip_address 10.235.0.131      !IP Address pool PGW!
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0154 DSCP_L2TP_CP 48                   !DSCP for L2TP_CP!

createmo asdf STN=0,TGTransport=RBR0073_TG0154,SuperChannel=0
createmo asdf STN=0,TGTransport=RBR0073_TG0154,SuperChannel=1

setmoattribute asdf STN=0,TGTransport=RBR0073_TG0154,SuperChannel=0 depE1T1Interface 2
setmoattribute asdf STN=0,TGTransport=RBR0073_TG0154,SuperChannel=1 depE1T1Interface 3
```

TCU Configuration

Configuring QoS Mapping Policy

Example:

DSCP-to-Queue mapping

```
createmo asdf STN=0,QoSPolicy=0
setmoattribute asdf STN=0,QoSPolicy=0 dscp2q48 1
setmoattribute asdf STN=0,QoSPolicy=0 dscp2q46 2
setmoattribute asdf STN=0,QoSPolicy=0 dscp2q28 3
```

DSCP-to-PCP mapping

```
setmoattribute asdf STN=0,QoSPolicy=0 dscp2pcp48 7
setmoattribute asdf STN=0,QoSPolicy=0 dscp2pcp46 5
setmoattribute asdf STN=0,QoSPolicy=0 dscp2pcp32 6
setmoattribute asdf STN=0,QoSPolicy=0 dscp2pcp28 4
setmoattribute asdf STN=0,QoSPolicy=0 dscp2pcp8   4
```

TCU Configuration

Finishing Configuration TCU

Example:

checkconsistency asdf

commit asdf forcedcommit

endTransaction asdf

TCU Configuration

Getting TCU logs

Example:

log clear

traceallmoattributeinlog

log read

VERIFYING TCU STATUS

Do ping test:

- Ping from TCU to ME Router
- Ping from TCU to OSS
- Ping from TCU to FTP Time Server
- Ping from TCU to NWIE and PGW

TCU Health Commands

TCU Health check

› Thank you

ERICSSON