

**Agenda Item:** 7.1, 10, 14.5 & 8

**Source:** Nortel Networks

**Title:** CCH and DSCH Procedures over Iur

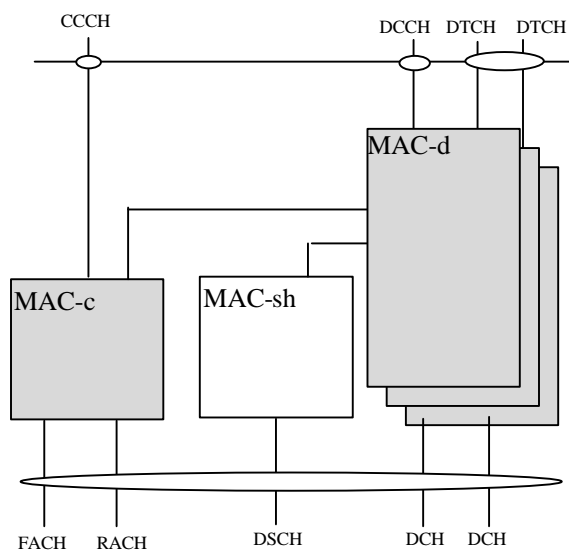
**Document for:**

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## 1 Introduction

This document is an evolution of document R3-99033 and presents a set of elementary procedures dedicated to the management of Common Channels as well as DSCH across the Iur.

As described in [3], the MAC Architecture for Common Channels is the following :



So the User Plane part of the Iur for Common Channels is MAC-d to MAC-c communication for CCH and MAC-d to MAC-sh communication for DSCH.

The Control Plane is MAC-c resource management allocated to MAC-d.

The main functions across the Iur for Common Channels are the following :

- Common Channels and Downlink Shared Channels Traffic Management
- MAC-d PDU transfert

This contribution takes the assumption that we will manage QoS for any mobile, particularly in DSCH state but also in FACH/RACH state.

## 2 Enhancement to DRNS Logical Model

*Note : The following section is presented with revision marks to the relevant section of [5]*

### 2.1.1.1.1 Overview

The model in **Error! Unknown switch argument.** shows the Drift Radio Network System as seen from the SRNC. It is modelled as a «black box» with a set of Radio Links on the Uu side of the box and another set of User Plane access ports on the Iur side of the box. The Radio Links are connected to the Iur user ports via the internal transport mechanisms of the DRNS. Operations for controlling the connections between ports are sent from the SRNC to the DRNC via an Iur Control Plane port.

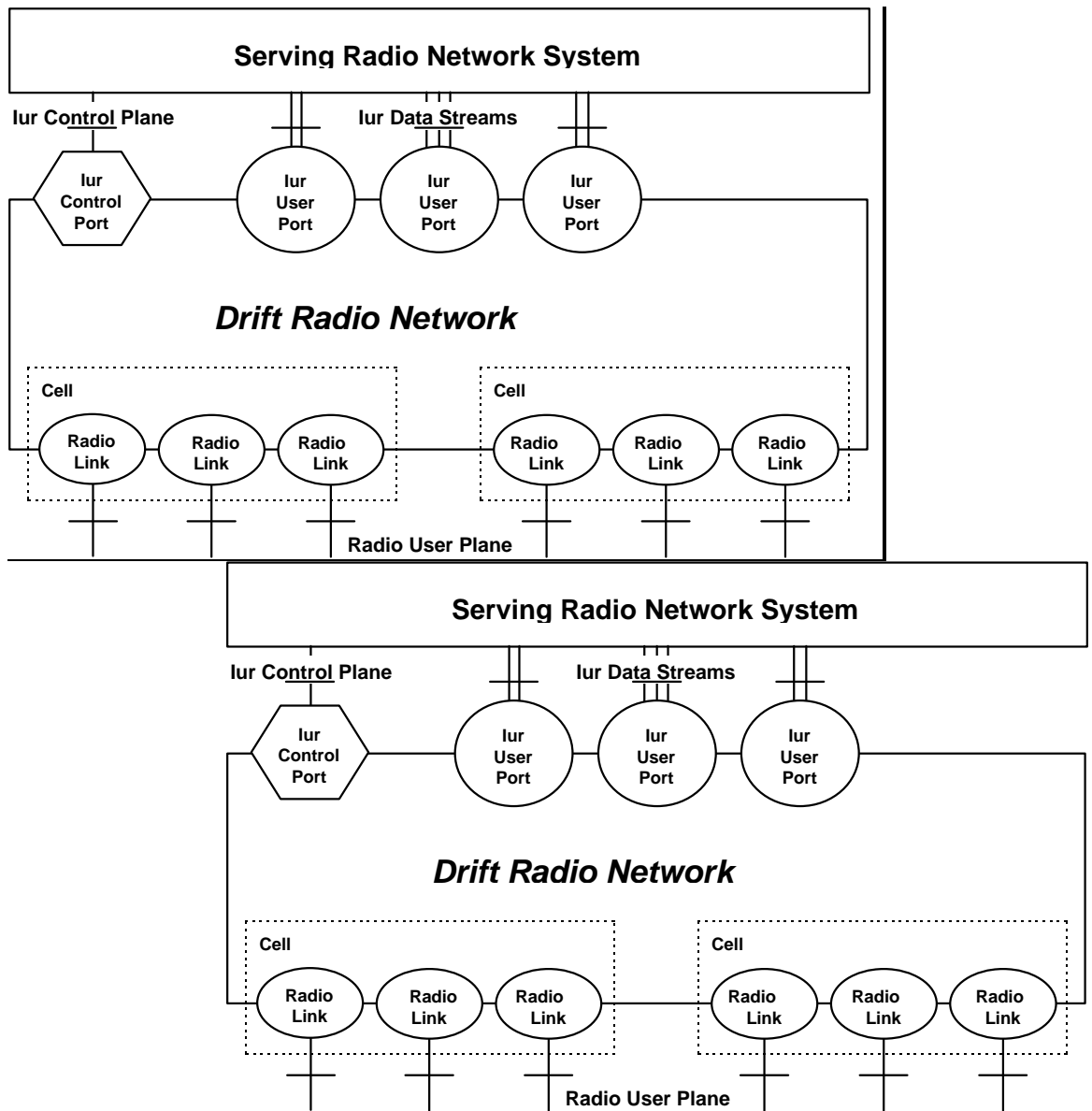


Figure 1. Drift RNS Logical Model

*Note : This figure is the Radio Network layer view and not the transport layer one.*

### 2.1.1.1.2 Logical Model Elements

#### 2.1.1.1.2.1 Radio Link

A Radio Link represents a User Plane access point on the UTRAN side of the Uu interface between the User Equipment and the UTRAN. It is associated with :

- a Cell identifier.
- a Radio Frequency Carrier identifier.
- a Physical Channel identifier (spreading code).

The semantics of a Radio Link include the following:

- It is created and destroyed by administrative procedures when a cell site and/or RF carrier is added to, or deleted from, the RNS.

- It can be attached to one and only one Iur User Port at any given time.
- Its resources are allocated and controlled by the DRNS.

#### 2.1.1.1.2.2 Cell

A Cell is a collection of Radio Links found at a specific location. It is defined by:

- a Cell identifier.

The semantics of a Cell include the following:

- It is created and destroyed by administrative procedures when a cell site and/or RF carrier is added to, or deleted from, the RNS.

#### ~~2.1.1.1.2.3 Iur Data Stream~~

~~One and one only Iur DCH data stream is associated with a transport bearer channel identifier.~~

~~The association for Iur CCH data stream is FFS.~~

#### 2.1.1.1.2.4 Iur DCH User Data Port

An Iur User DCH Data Port represents a User Plane access point transport bearer, carrying one Iur DCH Data Stream, on the Iur interface between the SRNS and DRNS. ~~It is associated with one or more Iur data streams.~~

The semantics of an Iur User Port include the following:

- It is created and destroyed by administrative procedures when transport facilities are added to, or deleted from, the Iur interface between the SRNS and DRNS. It can also be created and destroyed dynamically using ATM SVCs dynamically setup transport bearers to add or remove transport facilities.
- It is assigned and released by the SRNC in reaction to requests for bearer services from the UE.
- It may be attached to one or more Radio Links. When attached to Radio Links in the downlink direction, it acts as a point-to-multipoint connection for diversity transmission. When attached to multiple Radio Links in the uplink direction, it acts as a multipoint-to-point connection for diversity reception.
- The transmit and receive diversity resources required to implement the point-to-multipoint and multipoint-to-point connections are controlled by the DRNS.
- The Iur User Stream DCH Data Stream emanating from the Iur User DCH Data Port terminates in the SRNS connected to DRNS.

#### 2.1.1.1.2.5 Iur CCH Data Port

An Iur CCH Data Port represents a User Plane transport bearer, carrying one Iur CCH Data Stream, on the Iur interface between the SRNS and DRNS. The semantics of an Iur User Port include the following:

Note : Whether multiple Iur CCH Data Streams can be multiplexed on the same Iur CCH Data Port is FFS

- It is created and destroyed by administrative procedures when transport facilities are added to, or deleted from, the Iur interface between the SRNS and DRNS. It can also be created and destroyed dynamically using dynamically setup transport bearers to add or remove transport facilities.
- It is assigned and released by the SRNC in reaction to requests for bearer services from the UE.
- The Iur CCH Data Stream emanating from the Iur CCH Data Port terminates in the SRNS connected to DRNS.

#### 2.1.1.1.2.6 Iur Control Port

An Iur Control Port represents the Control Plane access point on the Iur interface between the SRNS and the DRNS. It is defined by:

- a transport bearer channel identifier.

The semantics of an Iur Control Port include the following:

- It is created via administrative procedures when the Iur interface is created.

## 3 RNSAP Procedures

### 3.1 Common Channel Traffic Context assignment

This procedure is used by the SRNS to request to the DRNS the reservation of resources necessary to ensure the requested QoS for the given Common Channel or DSCH Traffic Management.

The SRNC sends the RNSAP message **CCHT Assignment Request**. This message contains as parameters :

- Indicator whether MAC-c or MAC-sh is requested

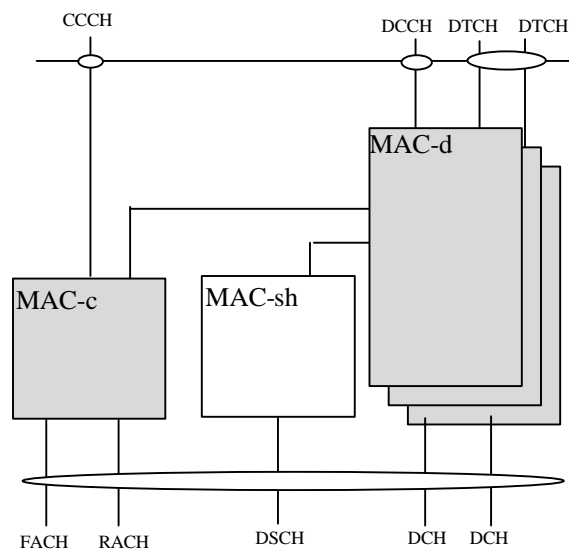
- Cell Identity which is used by the DRNS to select the proper MAC-c or MAC-sh instance
- UE Identity which is used by the DRNS to address the proper UE (e.g. RNTI)
- MAC-d Identity which is used by the SRNC to select the proper MAC-d instance
- The characteristics of the bearer including aspects such as data rates, QoS, etc.
- Priority level which is used both for pre-emption and scheduling by MAC-c or MAC-sh

On reception of that request the DRNS performs its own admission control by ensuring that the new CCHT is compatible with the already established ones.

If required the Iur Transport Bearer Setup can be done before or after the CCHT Assignment Request.

In case of success the DRNC returns a **CCHT Assignment Complete**. This message contains as parameters :

- MAC-d Identity which is used by the SRNC to select the proper MAC-d instance
- CCH Traffic Context Identity which is used by the DRNS to identify both the MAC-c or MAC-sh instance and the UE.
- c-RNTI allocated to the UE



If the Admission Control of the DRNS decides that the new CCHT cannot be established, the DRNC returns a **CCHT Assignment Failure**.

### 3.2 Common Channel Traffic Modification

This procedure is used by the SRNS to modify the characteristics of a Common Channel Traffic.

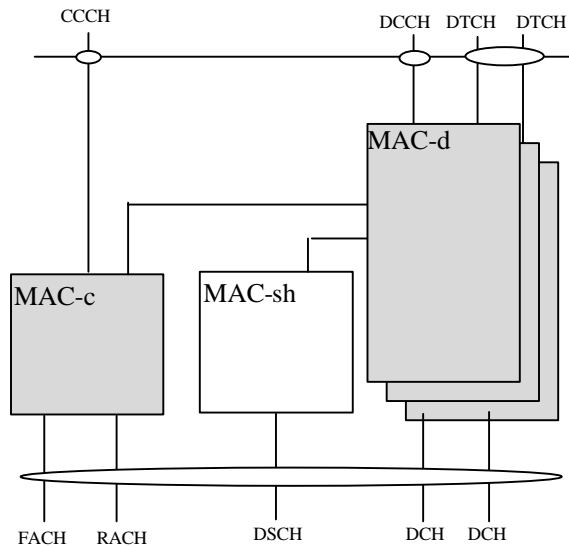
The SRNC sends the RNSAP message CCHT Modification Request. This message contains as parameters :

- MAC-d Identity which is used by the SRNC to select the proper MAC-d instance
- CCH Traffic Context Identity which is used by the DRNS to identify both the MAC-c or MAC-sh instance and the UE.
- The new characteristics of the bearer including aspects such as data rates, QoS, etc.
- The new priority level which is used both for pre-emption and scheduling by MAC-c or MAC-sh

On reception of that request the DRNS performs its own admission control by ensuring that the CCHT with its new characteristics is compatible with the other established ones.

In case of success the DRNC returns a **CCHT Modification Complete**. This message contains as parameters :

- MAC-d Identity which is used by the SRNC to select the proper MAC-d instance



If the Admission Control of the DRNS decides that the CCHT with its new characteristics cannot be established, the DRNC returns a **CCHT Modification Failure**.

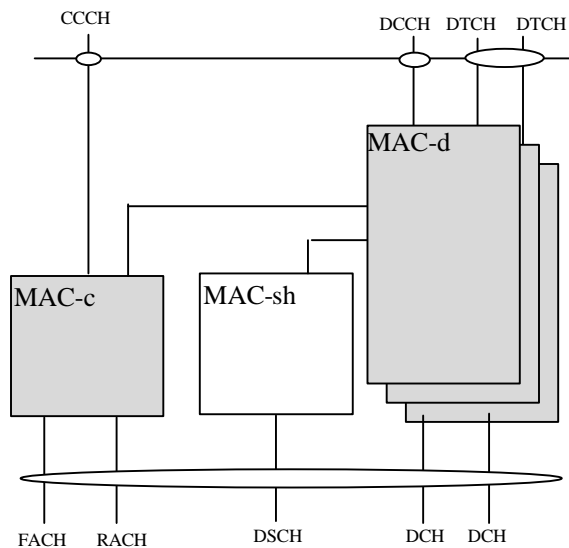
### 3.3 Common Channel Traffic release

This procedure is used by the SRNS to request the DRNS to release the resources reserved for a given CCHT.

The SRNC sends the RNSAP message **CCHT Release Request**. This message contains as parameters :

- CCH Traffic Context Identity which is used by the DRNS to identify both the MAC-c or MAC-sh instance and the UE.

If required the Iur Transport Bearer Release can be done.

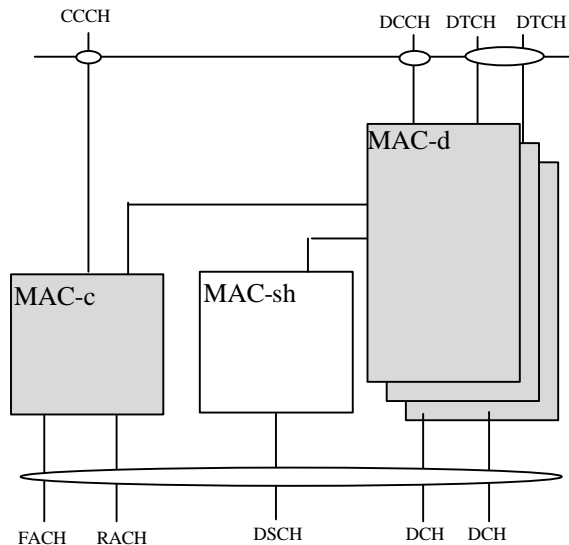


### 3.4 Common Channel Traffic Modification Required

This procedure is used by the DRNS to request to the SRNS to lower its requirements.

The DRNC sends the RNSAP message **CCHT Modification Required**. This message contains as parameters :

- The list of MAC-d Identities which should lower their requirements.
- For each CCHT, the suggested QoS.



## 4 User Plane Procedures

### 4.1 Downlink Transfer

This procedure is used by the SRNC to request to a DRNS the transmission of user data towards a specific UE using Common Channels.

The SRNC provides the DRNS with the following information :

- A MAC PDU
- Time to live : This scheduling information indicates to the DRNS the maximum delay within which the MAC PDU is meaningful. This information is used by the DRNC both to schedule the transmission of PDUs received from different SRNCs and also to discard outdated PDU. Scheduling is also performed using the priority given at the CCHT assignment.
- CCH Traffic Context Identity which is used by the DRNS to identify both the MAC-c or MAC-sh instance and the UE.

The format of a Downlink Iur CCH data frame is the following

Information element	Description
message type	Downlink Iur CCH data frame
Time to live	Maximum time allowed for the transmission of the Transport Bloc Set after which it should be discarded
CCH Traffic Context Identity	Used by the DRNS to identify both the MAC-c or MAC-sh instance and the UE
MAC-d PDU	Data to be sent on the Radio interface

When scheduling the MAC-d PDU, the MAC-c also maps the CCH Traffic Context Identity to the UE RNTI.

### 4.2 Downlink Flow Control

This procedure is used by the DRNC to flow control a SRNC.

The DRNC provides the SRNC with the following information :

- The list of MAC-d Identities which are using the congested MAC-c/MAC-sh instance
- Flow Control Parameters

The format of a Iur CCH Flow Control Frame is the following :

Information element	Description
message type	Iur CCH Flow Control Frame
MAC-d Identity	Used by the SRNC to select the proper MAC-d instance
Flow Control Parameters	Parameters used to flow control the MAC-d instance

### 4.3 Uplink Transfer

This procedure is used by the DRNC to send user data received from a specific UE on Common Channels (RACH) to its SRNC.

The DRNC provides the SRNC with the following information :

- The MAC-d PDU that was transported by the RACH
- MAC-d Identity which is used by the SRNC to select the proper MAC-d instance

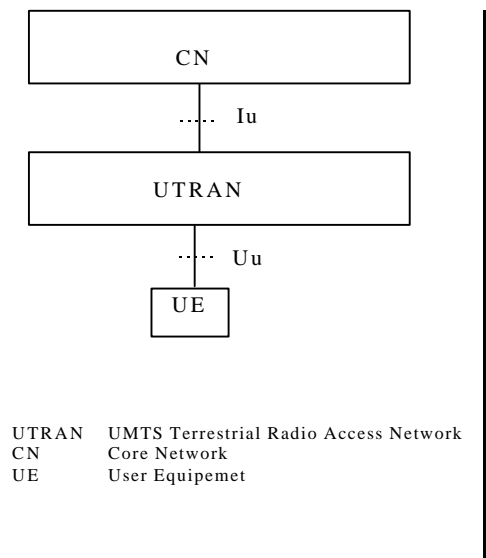
The format of an Uplink Iur CCH data frame is the following

Information element	Description
message type	Uplink Iur CCH data frame
MAC-d Identity	Used by the SRNC to select the proper MAC-d instance
MAC-d PDU	Data received on the Radio interface

## 5 Relation with Cell Update and Handovers

### 5.1 Cell Update in RACH/FACH Mode

This example shows how a Cell Update is managed when the UE is in RACH/FACH mode and when there is some QoS negotiated on common channels for that UE.



1. The UE sends a Cell Update message to its SRNC. This message is sent via a RACH and relayed back to the serving RNC.  
*Parameters : UE Identification, Cell Identification*
2. The SRNC requests the necessary QoS on common channels to the new Controlling RNC.  
*Parameters : Cell Identification, UE Identification, MAC-d instance Identification*
3. The new Controlling RNC grants the requested QoS and does the necessary reservation.  
*Parameters : MAC-d instance Identification, TrafficContext Identification*
4. The SRNC sends a Cell Update Confirm message to the UE. This message is sent to the Controlling RNC via a Downlink Transfer message and relayed to the UE via a FACH.
5. The SRNC releases the reserved resources on the previous Controlling RNC.  
*Parameter : CCH Traffic Context Identification*
6. The old Controlling RNC acknowledges the release.

## 6 Recommendation

Nortel proposes that section 3 of this contribution is introduced in [1] at the relevant place.

Nortel proposes that section 4 of this contribution is introduced in [2] at the relevant place.

Nortel Proposes that section 11.2.3.1 of [5] " DRNS logical Model over Iur" is updated according to section 2 of this contribution.

Nortel also proposes that the example of section 5 be captured in document [4].

## 7 References

- [1] S3.23 RNSAP Specification, Source : Ericsson (Editor)
- [2] S3.25 Iur Interface User Plane Protocols for CCH Data Streams, Source : Alcatel (Editor)
- [3] S2.21 MAC Protocol Specification, Source : TSG RAN WG2
- [4] I3.01 RAN Functions, Examples on Signalling Procedures, Source CSELT (Editor)
- [5] S3.01 RAN Overall Description, Source : Nortel (Editor)