

# **ESG**

Engineering Services Group

## ***Multiple PDP Contexts in UMTS***

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**Multiple PDP Contexts in UMTS**

80-W0958-1 Rev A

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## 1. Introduction

### 1.1. Purpose of this document

This white paper is intended to introduce the use of multiple PDP contexts in UMTS networks.

The principle of multiple primary PDP contexts and secondary PDP context is explained.

Information about the testing aspects is also included: the necessary AT commands are introduced and Qualcomm test mobile specific information is provided.

### 1.2. Assumptions

To restrict the discussion to the currently typical implementation the following assumptions are used:

1. PDP type is IPv4
2. PDP context activation is MS initiated

### 1.3. Naming Convention

The naming convention of “MT”, “TE”, and “MS” is used according to [1] and [7] and as also shown in Figure 1 below:

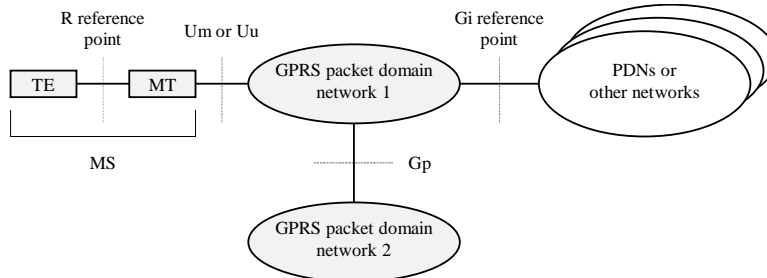


Figure 1: Packet Domain Access Interfaces and Reference Points

## 1.4. References

- [1] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description"
- [2] 3GPP TS 23.107: "Quality of Service, Concept and Architecture"
- [3] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects"
- [4] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols"
- [5] 3GPP TS 25.301: "Radio Interface Protocol Architecture"
- [6] 3GPP TS 27.007: "AT command set for User Equipment (UE)"
- [7] 3GPP TS 27.060: "General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS"
- [8] <http://www.iana.org/assignments/protocol-numbers>
- [9] <http://www.iana.org/assignments/port-numbers>

### 1.5. Abbreviations

AP	Access Point
APN	Access Point Name
GGSN	Gateway GPRS Support Node
GTP	GPRS Tunneling Protocol
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPv4	Internet Protocol version 4
MM	Mobility Management
MS	Mobile Station
NAS	Non-Access Stratum
NSAPI	Network layer Service Access Point Identifier
PDN	Packet Data Network
PDP	Packet Data Protocol
PS	Packet Switched
QoS	Quality of Service
RAB	Radio Access Bearer
RTSP	Real Time Streaming Protocol
SGSN	Serving GPRS Support Node
SIP	Session Initiated Protocol
TE	Terminal Equipment
TEID	Tunnel Endpoint Identifier
TI	Transaction Identifier
TFT	Traffic Flow Template
URL	Uniform Resource Locator
VoIP	Voice over IP

## 2. Multiple PDP Contexts in UMTS

As mobile phones develop, there will be a need to serve parallel applications running on them with simultaneous PS calls.

These PS calls can differ in their QoS (Quality of Service) parameters, and/or in the target network (PDN – Packet Data Network) to which they provide connection.

Multiple PDP contexts will have special significance when IMS is introduced and all the services will be PS (IP) based. In an IMS based network the MS can (and will) activate separate PDP contexts for SIP based signaling and for all the sessions of different, eventually parallel services (e.g. parallel VoIP call and PS data call, etc.). A different QoS – which matches the application - will be used for each connection.

The data flow (user plane) of a particular PDP context can terminate either in the MT itself or in the connected TE as shown in Figure 2 below. The application for which the connection is provided is provided either on the MT or on the TE respectively. An example for the first possibility is a video telephony client running on the mobile, for the second possibility a web browser running on the connected notebook.

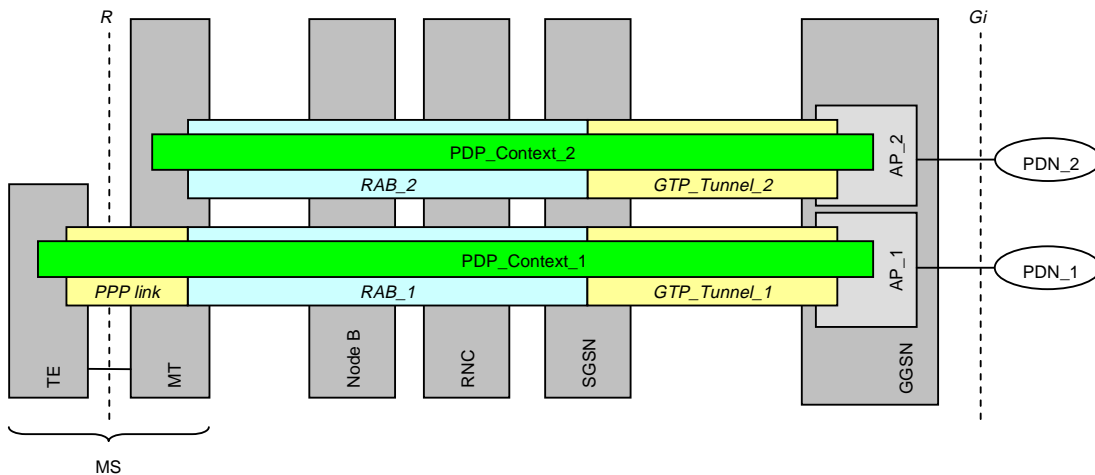


Figure 2: User Planes Terminating in the TE and in the MT

In IMS based systems it is expected that several embedded applications will run on the MT, requiring multiple PDP contexts. For the TE (e.g. connected PC) one additional PDP context may be also active.

Multiple PDP contexts have two sub-categories:

1. multiple primary PDP contexts: they provide connections to different PDNs
2. secondary PDP contexts: they provide connections to the same PDN but with different QoS

These are introduced in the following sections in details.

## 2.1. Multiple Primary PDP Contexts

Multiple primary PDP contexts are two or more PDP contexts independent from one another, each of them using one unique PDP address. They give the possibility to have simultaneous connections to different PDNs – e.g. to the internet for one application, while to a private network for another one.

Beside the unique PDP address, each PDP context has its own QoS and NSAPI (Network Layer Service Access Point Identifier, see later) assigned. Each PDP context has a separate RAB (Radio Access Bearer) and GTP tunnel to transfer user plane data.

The PDP contexts typically terminate in different access points on the network side (although it is allowed that they terminate in the same access point). The terminating access points can be located in the same or in different GGSNs.

The example in Figure 3 below shows the user plane path for three primary PDP contexts providing connections to three different PDNs:

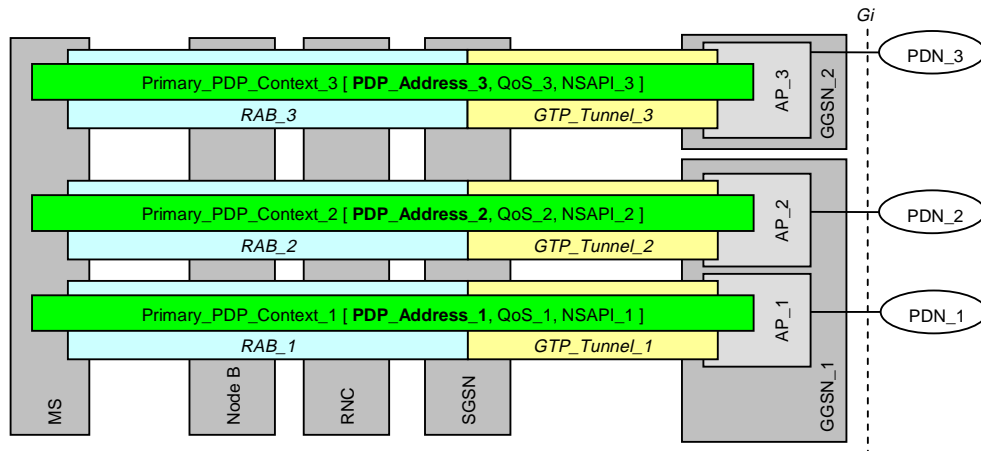


Figure 3: User Plane of Three Primary PDP Contexts

Primary PDP contexts can be activated or deactivated independently from one another.

QoS of any of the active PDP contexts can be modified with the PDP context modification procedure initiated by the MS or by the network. ([1])

## 2.2. Secondary PDP Context

A secondary PDP context is always associated with a primary PDP context. PDP address (IP address) and access point (AP) is re-used from the primary context. Hence the primary and the associated secondary PDP context provide connection to the same PDN with different guaranteed QoS.

One primary PDP context might have multiple secondary contexts assigned.

Each PDP context (i.e. the primary and all secondary) has its own RAB and GTP tunnel to transfer user plane data. Also, each context is identified by a unique NSAPI (see later).

The primary PDP context has to be active prior to activating an associated secondary PDP context.

Any secondary PDP context can be deactivated while keeping the associated primary context (and eventual other secondary PDP contexts) active. If a primary PDP context is deactivated, this will also deactivate all the assigned secondary PDP contexts.

QoS of any active primary or secondary PDP context can be modified with the PDP context modification procedure initiated by the MS or by the network. ([1])

As the PDP address (IP address) is common for the primary and for (all) the associated secondary PDP contexts, the TFT (Traffic Flow Template) is introduced to route downlink user plane data into the correct GTP tunnel and hence into the correct RAB for each context.

The example in Figure 4 below shows the user plane for a primary and two associated secondary PDP contexts:

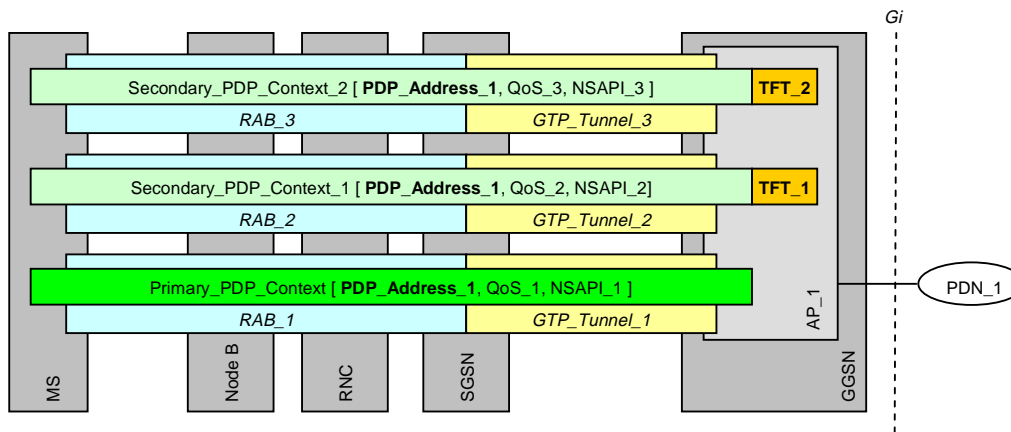


Figure 4: User Plane of One Primary and Two Secondary PDP Contexts

Combination of multiple primary PDP contexts and secondary PDP contexts is also possible. For example, two primaries with one secondary context for each will result in four active PDP contexts in total. The maximum number of supported PDP contexts is terminal dependent.

### 2.2.1. Traffic Flow Template (TFT)

In the case of secondary PDP context, the TFT is used to route downlink user plane data to the appropriate context. The TFT is an IP header filter used by the GGSN to forward IP packets into the correct GTP tunnel. Filtering can be based on one or more of the following filter attributes:

- Source address (with subnet mask)
- IPv4 protocol number
- Destination port range
- Source port range
- IPSec Security Parameter Index (SPI)
- Type of Service (TOS) (IPv4)

The TFT is provided by the MS in the Activate Secondary PDP Context Request message, it is stored by the GGSN, and is examined when routing downlink user plane data. The TFT can be modified or deleted with the MS initiated PDP context modification procedure. A TFT may be also assigned to a primary PDP context by means of the MS initiated PDP context modification procedure.

A TFT is built up from Packet Filters (minimum 1, maximum 8 of them) to provide flexibility in filtering.

The relationship between PDP contexts, TFTs and Packet Filters is illustrated in Figure 5 below:

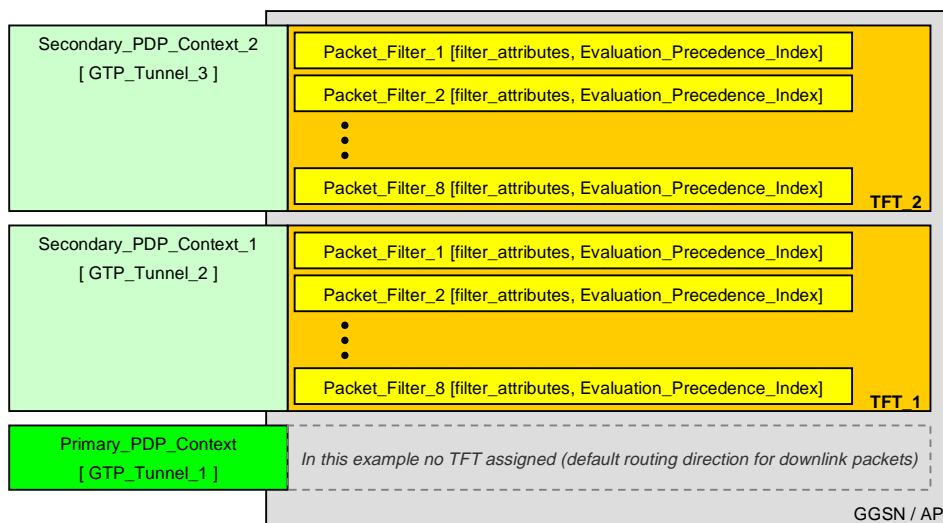


Figure 5: PDP contexts, TFTs and Packet Filters

The Evaluation Precedence Index specifies the order how Packet Filters are examined. It is a unique value for each Packet Filter applicable for a given primary and all the associated secondary PDP contexts.

If a data packet matches a Packet Filter, the packet is routed to the GTP tunnel of the associated PDP context. Otherwise the next Packet Filter (with higher Evaluation Precedence Index) will be examined.

## Multiple PDP Contexts in UMTS

At most one PDP context for each PDP address may exist without an assigned TFT. This may be either the primary or one secondary PDP context. This PDP context is the “default” routing direction for all the downlink packets which do not match any of the Packet Filters. If all PDP contexts have assigned TFTs, the non-matching downlink packets will be discarded by the GGSN.

The example in Figure 6 below illustrates how GGSN processes a downlink data packet in case of the presence of TFTs:

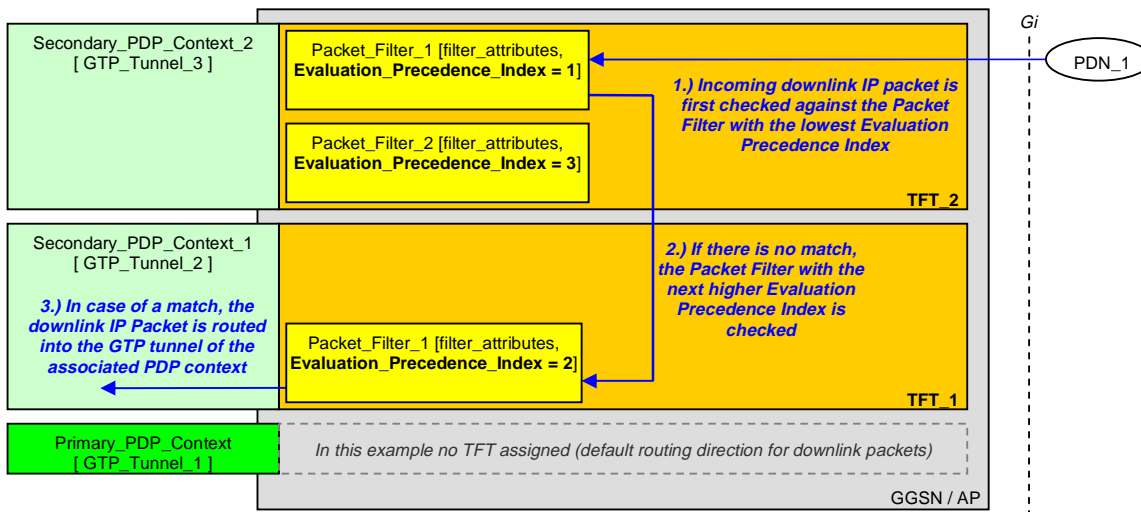


Figure 6: Matching a downlink data packet against Packet Filters

TFT is not used in the uplink direction. It is up to the MS to route the PDP packet via the PDP context with the QoS most appropriate for the packet’s sender application.

In the uplink direction GGSN does not check the packets against the TFT.

More details about the TFT can be found in [1].

### 3. Identifiers used for PDP contexts

In case of multiple active PDP contexts, multiple user plane and control plane connections span from the MS to the core network. Differentiation between these connections is based on several identifiers which are briefly introduced in this chapter.

#### 3.1. NSAPI (Network Layer Service Access Point Identifier)

NSAPI is used to identify the user plane connections of different PDP contexts in the MS and through the whole network.

The NSAPI is a unique identifier for each PDP context (including primary and secondary PDP contexts). It is chosen and sent by the MS at the (primary or secondary) PDP context activation.

In the SGSN and GGSN, the NSAPI identifies the PDP context associated with a MM context. There is a one-to-one relationship between the NSAPI, RAB, and PDP context. An NSAPI / IMSI pair is used to assign a TEID (see later) by the network.

Figure 7 below shows the relationship of NSAPIs, RABs, and PDP contexts for the case of two primary PDP contexts. The case with a primary and a secondary PDP context is similar (i.e. unique NSAPI and RAB ID is used for each context), the only difference is that the same IP address is used for both PDP contexts.

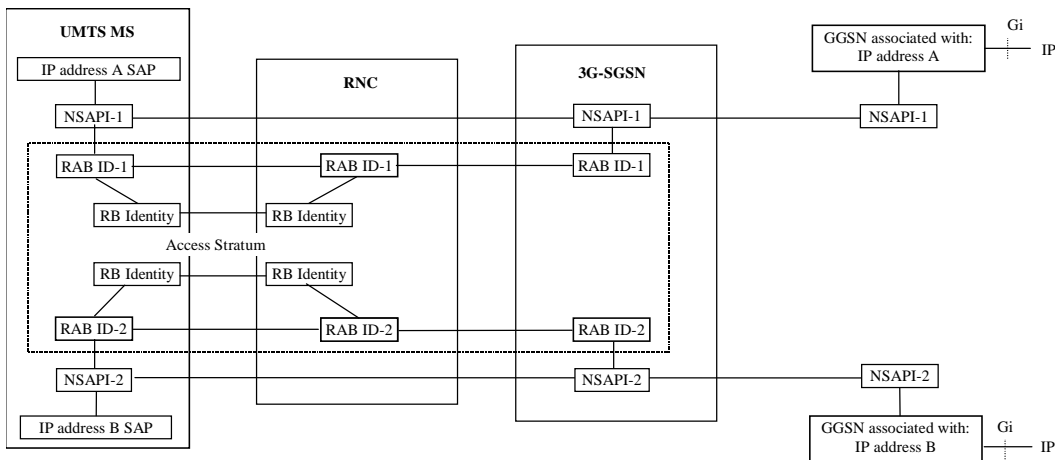


Figure 7: Use of NSAPI, RB Identity, and RAB ID

For more details about the NSAPI refer to [1], [3] and [4].

### 3.2. TI (Transaction Identifier)

The TI is the identifier of the NAS signaling connection for each active PDP context (together with the protocol discriminator). It is a unique identifier within the MS for each PDP context (including primary and secondary contexts).

The TI is used in the signaling message as a reference when modifying or deactivating a particular PDP context or when associating a secondary PDP context to a primary.

The TI is selected by the MS and is sent in the Activate PDP Context Request (or in the Activate Secondary PDP Context Request) message. SGSN also selects its own unique TI (independently from the MS) for each context during the PDP context activation procedure, and sends it to the MS in the Activate PDP Context Accept (or in the Activate Secondary PDP Context Accept) message.

For secondary PDP context activation a Linked TI is also sent by the MS in the Activate Secondary PDP Context Request message. The linked TI is the TI of an already active primary PDP context with which the new context will be associated. (The standard also allows referring to an already active secondary PDP context with the linked TI – in this case the primary context of this will be used as the association point.)

The example in Figure 8 below shows TI selection for a primary and a secondary PDP context, providing the linked TI at secondary PDP context activation, and finally deactivating the secondary PDP context:

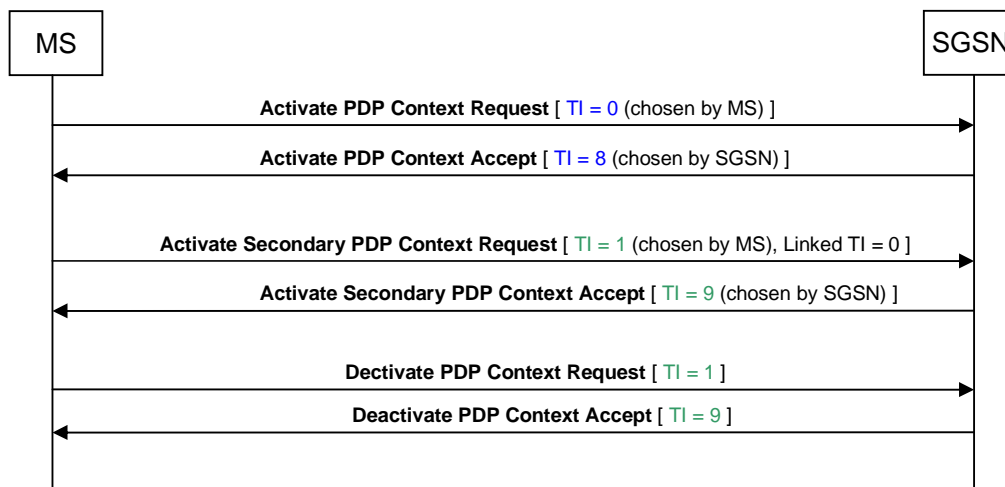


Figure 8: An example of TI selection by the UE and SGSN

For more details about the TI refer to [1], [3] and [4].

### **3.3. TEID (Tunnel Endpoint Identifier)**

The TEID identifies the GTP tunnels between the RNC, SGSN and GGSN. User plane is tunneled with GTP between the RNC, SGSN and GGSN. Control plane is tunneled with GTP between the SGSN and the GGSN.

The TEID is used only within the GTP protocol therefore it is not visible for the MS.

For the user plane (GTP-U) each PDP context has a one-to-one relationship between the TEID, NSAPI / IMSI and the PDP context.

For more details about the TEID refer to [1].

## 4. AT Commands for UMTS Packet Domain

This chapter lists the AT commands used between the TE and MT to define and activate multiple PDP contexts. Brief explanation and examples are also provided.

Simplifications are used. For full descriptions, please refer to [6].

### 4.1. General information on AT commands

Parameters used in the AT commands can be numeric or string parameters. String parameters are represented between double quotation marks (“ ”).

Each command has a

- Set form: to specify the parameter(s). The command is followed by the comma separated parameter list (e.g. AT+CGDCONT=1,"IP","internet")
- Read form: to query the current settings. The AT command is followed by a question mark (e.g. AT+CGDCONT?)
- Test form: to query the supported values. The command is followed by “=?” (e.g. AT+CGDCONT=?)

### 4.2. Define PDP Context

**Format:** AT+CGDCONT=<cid>,<PDP\_type>,[<APN>],[<pdp\_addr>]]

**Example 1:** AT+CGDCONT=1,"IP"

**Example 2:** AT+CGDCONT=1,"IP","internet"

Where

**<cid>:** Local PDP Context Identifier. A numeric parameter which specifies a particular PDP context definition and can be quoted in other PDP context related commands as reference (e.g. in AT+CGDSCONT, AT+CGTFT, AT+CGEQREQ, AT+CGACT, etc.)

**<PDP\_type>:** Packet Data Protocol Type. A string parameter, typically “IP” is used (for IPv4)

**<APN>:** Access Point Name. A string parameter (case insensitive) which is used to select an access point in the GGSN. If the value is null (“”) or omitted, the subscribed value will be requested.

**<PDP\_addr>:** PDP Address. A string parameter that identifies the MT in the address space applicable to the PDP. In case of IP PDP type this means the IP address. If the value is null or omitted the TE may provide the address (which will be used at PDP context activation) or a dynamic address will be requested and assigned by the GGSN. Typically dynamic IP address assignment is used (dynamic HPLMN PDP address).

Notes:

- To get the maximum number of PDP context definitions supported by the MT use the test form of this command (AT+CGDCONT=?)

## Multiple PDP Contexts in UMTS

- To delete the definition of a particular context use the following special form of the command: AT+CGDCONT=<cid> (e.g. AT+CGDCONT=1). This will also delete the definition of the secondary PDP context(s) associated to this primary PDP context.
- The read form of the command will not return the PDP address even if it has been assigned during the PDP context allocation. (The +CGPADDR command may be used to get the allocated address.)

### 4.3. Define Secondary PDP Context

**Format:** AT+CGDSCONT=<cid>,<p\_cid>

**Example 1:** AT+CGDSCONT=2,1

**Example 2:** AT+CGDSCONT=3,1

Where

**<cid>:** Local PDP Context Identifier. A numeric parameter which specifies a particular secondary PDP context definition and can be quoted in other PDP context related commands as reference (e.g. in AT+CGTFT, AT+CGEQREQ, AT+CGACT, etc.)

**<p\_cid>:** Primary PDP Context Identifier. The secondary PDP context will be associated with this (already defined) primary PDP context.

Notes:

- The primary PDP context with the identifier <p\_cid> has to be defined in advance (with the use of AT+CGDCONT)
- Context identifier(s) already assigned to primary context(s) can not be used for the secondary context(s) (i.e. the context identifier pool is common for all the primary and secondary contexts)
- To get the maximum number of PDP context definitions supported by the MT use the test form of the command (AT+CGDSCONT=?)
- To delete the definition of a particular context use the following special form of the command: AT+CGDSCONT=<cid> (e.g. AT+CGDSCONT=2)

### 4.4. Define Traffic Flow Template

**Format:** AT+CGTFT=<cid>,<packet filter identifier>,<evaluation precedence index>,<source address and subnet mask>,[<protocol number (ipv4)>],[<destination port range>],[<source port range>]]

**Example 1:** AT+CTFT=2,2,255,"192.168.200.0.255.255.255.0"

**Example 2:** AT+CTFT=2,1,1,"192.168.11.0.255.255.255.0",17,200.300,300.400

Where

**<cid>**: (local) PDP Context Identifier. A numeric parameter which refers to a particular (primary or secondary) PDP context definition (used in the +CGDCONT or +CGDSCONT command)

**<packet filter identifier>**: a numeric parameter (from 1 to 8) to identify different packet filters used for a given PDP context.

**<evaluation precedence index>**: a numeric parameter (from 0 to 255) to define the evaluation order of all the packet filters (for all PDP contexts of a given PDP address). The packet filter with the smallest evaluation precedence index is processed first.

**<source address and subnet mask>**: a string parameter containing the source IP address and subnet mask in dot separated form "a1.a2.a3.a4.m1.m2.m3.m4" where a1.a2.a3.a4 is the IP address and m1.m2.m3.m4 is the subnet mask.

**<protocol number (ipv4)>**: a numeric parameter (from 0 to 255) referring to the protocol used above IP (v4). Protocol number of TCP=6, of UDP=17. For further protocols refer to [8].

**<destination port range>** and **<source port range>**: port range of the protocol used above IP in dot separated form f.t where f is the start port number and t is the end port number, both range from 0 to 65535. For TCP and UDP port numbers please refer to [9].

Note:

- To delete (all) the TFT definition(s) for a particular context use the following special form of the command: AT+CGTFT=<cid> (e.g. AT+CGTFT=2)
- Other filter attributes also exist (IPSec Security Parameter Index, Type of Service) which are not introduced here

#### 4.5. Define QoS Profile

**Format:** AT+CGEQREQ=<cid>,<Traffic class>,[<Maximum bitrate UL>,<Maximum bitrate DL>,[<Guaranteed bitrate UL>,<Guaranteed bitrate DL>]]]

**Example 1:** AT+CGEQREQ=1,2,64,384

**Example 2:** AT+CGEQREQ=1,4

Where

**<cid>**: (local) PDP Context Identifier. A numeric parameter which refers to a particular (primary or secondary) PDP context definition (used in the +CGDCONT or +CGDSCONT command)

**<Traffic class>**: a numeric parameter referring to the UMTS bearer traffic class with the following mapping: 0=conversational, 1=streaming, 2=interactive, 3=background, 4=subscribed value

**<Maximum bitrate UL>**, **<Maximum bitrate DL>**, **<Guaranteed bitrate UL>** and **<Guaranteed bitrate DL>**: numeric parameters for the respective requested bitrates (at the SAP), expressed in kbit/s

## Multiple PDP Contexts in UMTS

### Notes:

- To delete the QOS definition for a particular context use the following special form of the command: AT+CGEQREQ=<cid> (e.g. AT+CGEQREQ=1)
- Please note that the mapping of the Traffic Class value used in this command differs from the mapping used in the Activate PDP Context Request message (see [4])
- When requesting “conversational” or “streaming” traffic class, the guaranteed bit rate and the maximum bit rate should be explicitly specified

## 4.6. Activate/Deactivate PDP Context

**Format:** AT+CGACT=<state> ,[<cid>[,<cid>[,...]]]

**Example 1:** AT+CGACT=1,1

**Example 2:** AT+CGACT=1,1,2

### Where

**<state>:** 1=activate, 0=deactivate

**<cid>:** (local) PDP Context Identifier. A numeric parameter which refers to a particular (primary or secondary) PDP context definition (used in the +CGDCONT or +CGDSCONT command)

### Notes:

- PDP context definition (AT+CGDCONT or AT+CGDSCONT) has to exist prior to issuing this command
- Before activating a secondary PDP context the associated primary PDP context has to be active and a TFT definition (AT+CGTFT) has to exist. (At most one PDP context per PDP address is allowed without TFT definition.)
- PS attach will be performed automatically prior to PDP context activation (if not done yet)
- If no <cid> is provided the command applies to all defined PDP contexts
- Successful activation is indicated with the response OK, failed activation with the response ERROR
- The read form of the command (AT+CGACT?) returns the current activation states for all the defined PDP contexts
- After PDP context activation the MT remains in command state

## 5. Testing Multiple PDP Contexts with the Qualcomm Test Mobile

This section contains information about how to test multiple PDP context scenarios with the Qualcomm 6250 / 6275 / 6280 test mobiles.

Qualcomm test mobiles currently have the following capabilities:

- maximum 3 primary PDP context is supported
- up to 2 secondary PDP contexts per primary PDP context is supported
- the number of simultaneous PDP context can not exceed 6 (therefore e.g. 3 primary context and 2 secondary for each is not possible)

The test mobiles have an embedded application called Media Player which can be used to initiate PDP contexts and play a streaming video file from a streaming server. In addition to this, a connected PC also can be used for testing PDP contexts.

Please note that features described in the following sections may change with the software version.

### 5.1. Configuring the Qualcomm Test Mobile for testing Multiple PDP Contexts

#### 5.1.1. Setting the APN for Test Mobile Initiated PDP Contexts

PDP contexts can be initiated from the test mobile with the embedded Media Player application.

In this case the PDP context's APN (optionally also the PDP type, PDP address and DNS address) has to be set up on the test mobile. The values can be configured and stored for 16 different profiles accessible under the menu point "Datastats → Settings → Edit Data Profile". If this configuration is not done, the mobile will request subscribed values at PDP context activation.

To set which profile should be used by the Media Player (when activating a primary PDP context), use the menu point "Player → Settings → Choose Primary PDP Profile...". Select the desired profile here or choose "use default" in which case the default profile (specified under "Datastats → Settings → Select Active Data Profile") will be used.

*Note:*

- The profiles listed under "Datastats → Settings → Edit Data Profile" ("profile1", "profile2", etc.) are local for the test mobile's applications and are not mapped to the <cid> (PDP context identifier) used in the AT commands.

#### 5.1.2. Setting QoS for Test Mobile Initiated PDP Contexts

For the primary PDP context initiated by the Media Player application the QoS can be set with the following steps (unless we want to use the subscribed values):

## Multiple PDP Contexts in UMTS

1. From a connected PC use the AT+CGEQREQ command (with a terminal program) to define a QoS profile for an arbitrary PDP context identifier with <cid> = x (where x is an integer from 1 to 16).
2. With the EFS Explorer software (which is part of the QPST package) open the test mobile's file system and copy the file  
"pdp\_profiles\atcop\_profiles\profilex" into the folder  
"pdp\_profiles\sockets\_profiles".  
This makes the QoS definition accessible for Media Player.
3. Configure the Media Player to use this profile by selecting "profilex" under  
"Player → Settings → Choose Primary PDP Profile...".

For the secondary PDP context initiated by the Media Player the QoS can not be set but it will be decided by the application itself:

- traffic class is "streaming"
- maximum and guaranteed uplink and downlink bit rate is decided based on the streaming clip's parameters (Media Player contacts the streaming server using the primary PDP context and queries the session description of the requested clip at RTSP initialization)

### Notes:

- Once the QoS profile has been copied with EFS Explorer, the <cid> = x can be freely used again with the AT commands, without influencing the settings for the mobile's embedded application.
- Network can offer a lower QoS in the Activate PDP Context Accept message than requested by the MT. In this case the MT has the right to deactivate the PDP context. If this happens for the secondary PDP context, the Qualcomm test mobile will do the deactivation and will start streaming on the primary PDP context.

### 5.1.3. Setting the URL of the Streaming File

The embedded Media Player application of the test mobile gives a possibility to trigger PDP context activation from the mobile itself and play a video file from a streaming server. To do so the URL of the streaming file (server address and file name) has to be configured on the mobile with the following steps:

1. Create a file on the PC named e.g. streaming\_video.url
2. The file should contain the URL of the streaming file in the format like e.g. rtsp://10.10.10.1/videofile.3gp (it is recommended to use .3gp files)
3. With the EFS Explorer software (which is part of the QPST package) copy this file into the test mobile's file system, into the following folder :  
\\brew\mod\mediaplayer\media\

### Note:

- If the streaming server is not accessible the mobile will deactivate the PDP context

#### 5.1.4. Configuring Media Player to use Primary or Secondary PDP Context

To choose if Media Player should stream on a primary or on a secondary PDP context, use the field “Player → Settings → Enable/Disable QoS”.

- If this field is set to “On”, then a primary plus a secondary PDP context is activated by the Media Player. The secondary PDP context is used for the streaming.
- If this field is set to “Off” then a primary PDP context is activated and used for the streaming.

Notes:

- To configure the APN and QoS used by the primary PDP context, please refer to the previous sections.
- It is not possible to associate the secondary PDP context initiated by Media Player to a primary context initiated from the PC.

#### 5.1.5. Getting information about active calls

To display the active PDP contexts on the test mobile at any time, press the red “End” key. This will list all the ongoing calls (PS and CS).

The assigned and current data rate (uplink and downlink) can be checked with the “Info” menu point for each PDP context.

Deactivation of a particular PDP context is also possible from the menu with the “End” menu point.

### 5.2. Testing Multiple PDP Contexts from the Test Mobile Only

With the Media Player application it is possible to test one primary or a primary plus a secondary PDP context (depending on the setting of “Player → Settings → Enable/Disable QoS”, as described before).

In the second case user plane can be tested only for the secondary PDP context as the streaming traffic will use this context. User plane of the primary PDP context is used just briefly in the RTSP start-up phase when getting clip information from the streaming server.

To play a streaming file with Media Player go to “Player → Play File... → fs:/~/media →”, choose the appropriate file name, and click the “Play” button in the bottom left corner of the screen. Media Player activates the PDP context (primary, or primary plus secondary), buffers the streaming video and starts to play it.

Note:

- To configure the APN and QoS used by the primary PDP context, and the URL of the streaming file, please refer to the previous sections.

### **5.3. Testing Multiple PDP Contexts from the Connected PC**

When testing multiple PDP contexts from the connected PC (TE) we have the restriction that user plane can not be tested. This comes from the “tradition” of the serial modem port (over USB) which is switched to data mode after the connection is set up.

However, it is possible to test the signaling (set up and tear down of multiple PDP contexts) using the AT commands.

Any combination of multiple primary, or primary plus secondary PDP contexts can be tested this way.

To perform this, connect to the test mobile’s modem port with a terminal program (e.g. with SecureCRT or with Hyper Terminal) and type in the necessary AT commands. (To find out the test mobile modem port check “Control Panel → Phone and Modem Options → Modems tab”.)

The following example gives the steps of setting up one primary and one secondary PDP context and then tearing down them:

```
at+cgdcont=1,"ip","internet"  
OK  
at+cgdscont=2,1  
OK  
at+cgtft=2,1,0,"139.75.47.41.255.255.255.255"  
OK  
at+cgeqreq=1,3  
OK  
at+cgeqreq=2,2,64,64  
OK  
at+cgact=1,1  
OK  
at+cgact=1,2  
OK  
at+cgact=0,2  
OK  
at+cgact=0,1  
OK
```

### **5.4. Combined testing from the PC and from the MT**

In this case one PDP context is set up from the PC in the “traditional” way, starting a dial-up connection.

Another primary PDP context, or another primary plus an associated secondary PDP context is set up from the test mobile using the Media Player application.

Hence two primaries, or two primaries plus a secondary PDP context can be active simultaneously.

The user plane can be tested for both PDP contexts (i.e. for the one initiated from the PC as well as for the one initiated from the test mobile).

Setting up the contexts from the PC and from the test mobile can happen in any order.

## *Multiple PDP Contexts in UMTS*

### *Notes:*

- To configure the first PDP context use the AT+CGDCONT command from the notebook unless we want to use the subscribed values. The AT command can be entered either with a terminal program or via “Control Panel → Phone and Modem Options → Modems tab → Qualcomm USB Modem → Advanced tab → Extra initialization commands”. The setting will be stored in the test mobile. QoS can be defined in the same way with the AT+CGEQREQ command.
- To configure the APN and QoS used by the Media Player for the primary PDP context, and to configure the URL of the streaming file, please refer to the previous sections.
- To choose if the Media Player should stream on a primary or on a secondary PDP context use the field “Player → Settings → Enable/Disable QoS”, as described before. If Media Player is configured to stream on a secondary context, first it will also activate a primary PDP context.
- It is not possible to associate a secondary PDP context initiated from the test mobile (by Media Player) to a primary context initiated from the PC.

## **6. Summary**

Multiple PDP contexts are designed to provide simultaneous connections for different applications on the MS. They will have special significance when IMS is introduced.

If the applications require connections to different PDNs then multiple primary PDP contexts can be used.

If the applications require connections to the same PDN but with different QoS, then secondary PDP context(s) can be used. In this case the MS has to provide the TFT in order to route downlink traffic.

The identifiers used by the MS for multiple PDP contexts are the NSAPI for the user plane and the TI for the control plane.

Multiple PDP contexts can be tested either with embedded applications from the mobile itself or by means of AT commands from the connected PC.