3GPP TSG_CN#6 **NP-99429**

ETSI SMG3 Plenary Meeting #6,

Nice, France

13th – 15th December 1999

Agenda item: **5.3.3**

Source: **TSG_N WG3**

Title: **CRs to 3G Work Item Access to ISPs**

Introduction:

This document contains **"1"** CR **on Work Item Access to ISPs** agreed by **TSG_N WG3** and forwarded to **TSG_N Plenary** meeting #6 for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N3-99396	29.061	007		B	R99	3.1.0	3.2.0	ACCESS TO AN INTRANET/ISP WITH DHCP END TO END

3GPP TSG-CN WG3/SMG3 WPD Meeting #7
Sophia-Antipolis, France, 29 Nov- 03 Dec 1999

Document N3-99~~396~~
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

29.061	**CR**	**007**	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	CN #6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [X]
(at least one should be marked with an X)

Source: TSG_N3 **Date:** 1999-11-25

Subject: Access to an Intranet/ISP with DHCP end to end

Work item: Access to ISPs and Intranets – Wireless/Remote access to LANs

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

The access to an Intranet or ISP by running DHCP between the TE and a server in the Intranet/ISP domain is introduced. The corresponding interworking with the PDN is described in a new section.

At PDP context activation the MS requests an APN offering the DHCP service. The IP address of the PDP context is provisionally set to 0.0.0.0 as no IP address is allocated at this moment.
The TE runs a DHCP client, after the PDP context has been successfully activated, to retrieve the IP address and other configuration parameters from a DHCP server located in the Intranet/ISP domain. The PDP context is then updated through the GGSN-initiated modification procedure to reflect the newly allocated IP address.
A Packet Domain-specific DHCP Relay Agent is needed in the GGSN to allow for the correct routing of broadcast DHCP messages.

Clauses affected: 2, 3, New section (X)

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	23.003; 23.060; 29.060
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments: This CR relates to the approved CR 025 on 23.060, which extends the PDP type IP to support e.g. End-to-End DHCP or Mobile IP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

[23~~0~~] IETF RFC 2131 (1997): "Dynamic Host Configuration Protocol".

[24~~1~~] IETF RFC 1542 (1993): "Clarification and Extensions for the Bootstrap Protocol".

3 Definitions, abbreviations and Symbols

3.2 Abbreviations

For the purposes of this specification the following abbreviations apply:

DHCP	Dynamic Host Configuration Protocol
LAN	Local Area Network
MTU	Maximum Transfer Unit

X Interworking with PDN (DHCP)

X.1 General

In current LAN environments the most commonly used configuration protocol is DHCP (Dynamic Host Configuration Protocol, [20]). It provides a mechanism for passing a large set of configuration parameters to hosts connected to a TCP/IP network (IP address, sub-net mask, domain name, MTU, etc.) in an automatic manner. Moreover DHCP may assign IP addresses to clients for a finite lease time, allowing for sequential reassignment of addresses to different users.

~~GPRS~~The Packet Domain offers the end user the possibility to run DHCP end-to-end the same way as he does when connected directly to a LAN (e.g. an enterprise Intranet). No modifications should be required in common implementations of DHCP clients and servers. However a ~~GPRS~~ Packet Domain-specific DHCP relay agent [21] is needed in the GGSN so as to allow correct routing of DHCP requests and replies between the TE and the DHCP servers.

At PDP context activation no IP address is allocated, this is done afterwards through DHCP. After the TE's configuration has been completed by DHCP, the PDP context is update by means of the GGSN-initiated PDP Context Modification Procedure in order to reflect the newly assigned IP address.

X.2 PDN Interworking Model for DHCP

A DHCP relay agent shall be located in the GGSN used for interworking with the IP network as illustrated in the following figure A.

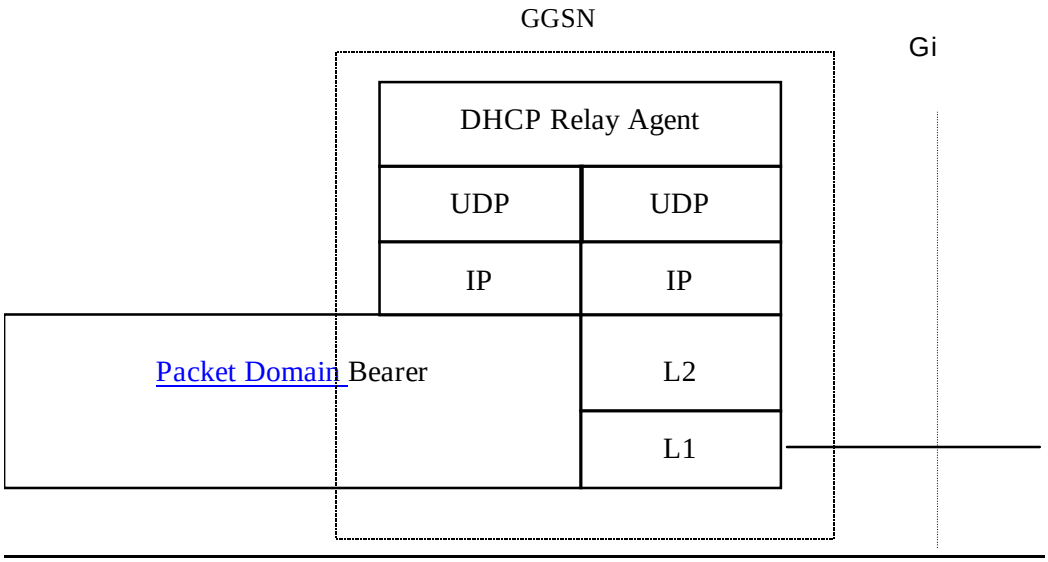


Figure A: The protocol stacks for the Gi IP reference point for DHCP

The DHCP relay agent relays the requests received from the DHCP client to the DHCP server(s), and the replies received from the server(s) to the corresponding client. The DHCP relay agent allows for the replies from DHCP servers to be delivered to the correct terminal, as the logical connection from the MT terminates in the GGSN, and consequently only the GGSN holds enough information to locate the DHCP client. How the DHCP relay agent identifies the MT based on the DHCP messages is out of the scope of GPRS standardisation.

DHCP provides mechanisms for user authentication and integrity protection, but does not offer any message confidentiality, therefore additional mechanisms (e.g. IPsec tunnel) may be provided if the link towards the external network is not secure. However this is out of the scope of this specification.

Apart from the particulars mentioned above, this model is basically the same as the one for interworking with IP networks described elsewhere in this Specification. Using DHCP corresponds to the transparent access case as the GGSN does not take part in the functions of authentication, authorisation, address allocation, etc.

X.2.1 Address allocation by the Intranet or ISP

The MS is given an address belonging to the Intranet/ISP addressing space. The address is given dynamically immediately after the PDP context activation. This address is used for packet forwarding between the Intranet/ISP and the GGSN and within the GGSN.

The MS may authenticate itself to the Intranet/ISP by means of the relevant DHCP procedures (DHCP authentication is currently described in an Internet Draft).

The protocol configuration options are retrieved from the DHCP server belonging to the Intranet/ISP.

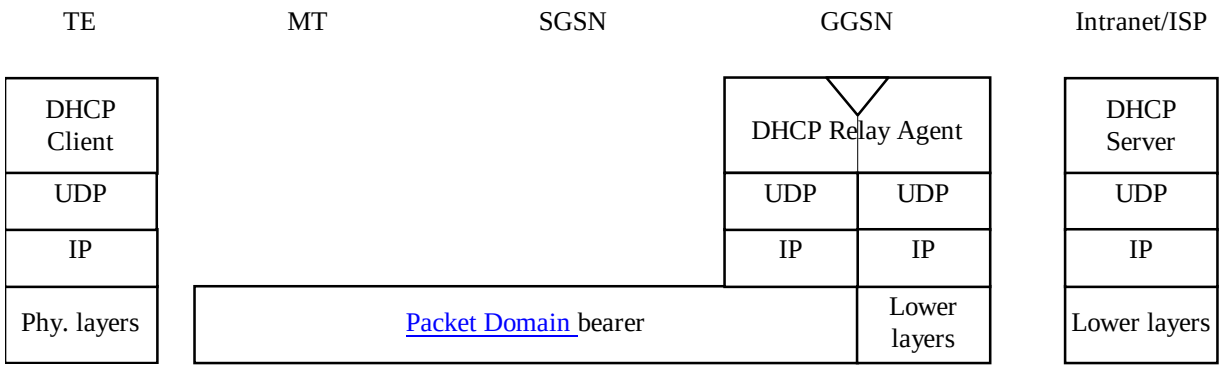


Figure B: Protocol stack for access with DHCP end-to-end

The following description bullet items describe the signal flow. For a detailed description of the DHCP messages refer to [23], [24]. The end-to-end protocol configuration is depicted in figure B.

1) The TE and MT exchange several AT commands carrying the QoS and other parameters requested by the TE, and requesting the activation of a PDP context of PDP type IP. The TE selects the APN of the configured Intranet/ISP offering a DHCP service, or the APN consisting of the Reserved Service Label for DHCP that the user has subscribed to. In the latter case the TE will be connected to a PLMN operator-configured service provider offering a DHCP service (according to the APN selection rules).

2) The MT sends the Activate PDP Context Request message to the SGSN with an empty PDP address field.

3) The SGSN selects a GGSN based on the APN requested by the MS and sends a Create PDP Context Request message to that GGSN. The GGSN replies with a Create PDP Context Response message. If the GGSN has not been configured by the operator to use external PDN address allocation with DHCP for the requested APN, the cause shall be set to 'Service not supported'. No IP address is assigned at this point; the PDP address returned by the GGSN is set to 0.0.0.0, indicating that the IP address is not yet assigned and shall be negotiated by the TE with the Intranet/ISP after the PDP context activation procedure.

4) Depending on the cause value received in the Create PDP Context Response the SGSN sends either an Activate PDP Context Accept or an Activate PDP Context Reject back to the MT. In case of a successful activation the PDP context is established with the PDP address set to 0.0.0.0.

5) Upon reception of the Activate PDP Context Accept, the MT sends an AT response to the TE that acknowledges the completion of the PDP context activation procedure.

6) The TE sends a DHCPDISCOVER message with the IP destination address set to the limited broadcast address (all 1s). The GGSN will pass the DHCPDISCOVER to the DHCP relay agent which will relay the request to the DHCP server configured for the APN of the PDP context. If more than one DHCP server is configured for a given APN, the request will be sent to all of them. The DHCP relay agent will add enough information to the DHCPDISCOVER message to be able to relay the replies back to the MS. How this is done is out of the scope of ~~GPRS~~ UMTS standardisation.

7) DHCP servers receiving the DHCPDISCOVER request reply by sending a DHCPOFFER message including an offered IP address. The DHCP relay agent forwards the replies to the proper MS.

8) The TE chooses one of the possibly several DHCPOFFERs and sends a DHCPREQUEST confirming its choice and requesting additional configuration information. The relay agent relays the DHCPOFFER as explained in step 6.

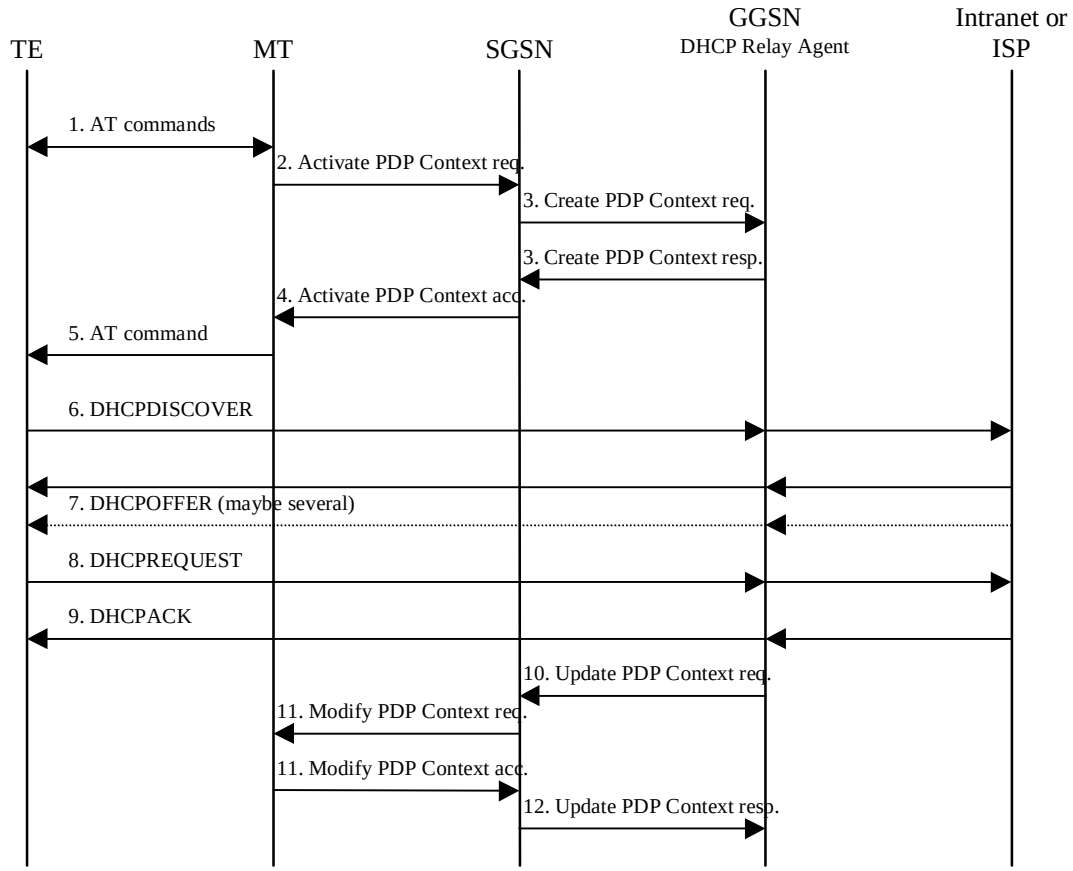
9) The selected DHCP server receives the DHCPREQUEST and replies with a DHCPACK containing the configuration information requested by the TE. The DHCP relay agent relays the DHCPACK to the TE.

10) The DHCP relay agent passes the allocated IP address to the GGSN which stores it in the corresponding PDP context. The GGSN then initiates a PDP context modification procedure by sending an Update PDP Context Request to the appropriate SGSN with the End User Address information element set to the allocated IP address.

11) The SGSN sends a Modify PDP Context Request to the MT with the allocated IP address in the PDP Address information element. The MT acknowledges by sending a Modify PDP Context Accept to the SGSN.

12) The SGSN sends an Update PDP Context Response to the GGSN. The PDP context has been successfully updated with the allocated IP address.

Example: In the following example a successful PDP context activation with use of DHCP from end to end is shown.


TE
MT
SGSN
GGSN
DHCP Relay Agent
Intranet or
ISP
1. AT commands
2. Activate PDP Context req.
3. Create PDP Context req.
3. Create PDP Context resp.
4. Activate PDP Context acc.
5. AT command
6. DHCPDISCOVER
7. DHCPOFFER (maybe several)
8. DHCPREQUEST
9. DHCPACK
10. Update PDP Context req.
11. Modify PDP Context req.
11. Modify PDP Context acc.
12. Update PDP Context resp.