3GPP TSG CN Plenary Meeting #13 **NP-010492**
Beijing, China, 19th –21st September 2001

Source: **TSG CN WG 1**

Title: **CR to R99 (with respective mirror CR) on Work Item GPRS towards 04.65 and 44.065**

Agenda item: **7.12**

Document for: **APPROVAL**

Introduction:

This document contains **2** CRs on **R99 (with mirror CR) to** Work Item **"GPRS"**, that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #13 for approval.

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Version-Current	Workitem
04.65	A074		N1-011199	R99	Conditions for header compression	F	8.1.0	GPRS
44.065	001		N1-011200	Rel-4	Conditions for header compression	A	4.0.0	GPRS

3GPP TSG-CN1 Meeting #19
Helsinki, Finland, 27.-31. August 2001

Tdoc N1-011199

CR-Form-v4

CHANGE REQUEST

⌘ **04.65** **CR** **A074** ⌘ ev **-** ⌘ Current version: **8.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☒

Title: ⌘	Conditions for header compression	
Source: ⌘	Siemens AG	
Work item code: ⌘	GPRS	***Date:*** ⌘ 27.08.01
Category: ⌘	**F**	***Release:*** ⌘ R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change: ⌘	With the header compression which is described in RFC 2507 also UDP/IP header can be compressed. This CR clarifies that not only TCP/IP headers compression will be possible. In addition the clarification was done that the compressor as well as the decompressor (in the MS as well as in the SGSN) is working with the same parameter set for one NSAPI. Because of this all the header compression parameters for RFC 2507 header compression shall be from type 'down' in the 'sence of negotiation'
Summary of change: ⌘	Clarification that not only TCP/IP header compression is described in the 04.65. The sence of negotiation will be changed from 'From compressor to decompressor' to 'down' for all RFC 2507 header compression parameters.
Consequences if not approved: ⌘	Interpretation mismatches: With the current statements in the 04.65 it is not clear that also UDP/IP header compression (RFC2507) will be possible. It will be not clear which parameter set will be valid in the MS as well as in the SGSN for compression and for decompression.

Clauses affected: ⌘	6.5 and 6.5.3	
Other specs affected: ⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘
Other comments: ⌘		

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6.5 Protocol control information compression

Protocol control information compression is an optional SNDCP feature. ~~Only TCP/IP header compression has been specified in the present document.~~

Negotiation of the supported algorithms and their parameters is carried out between MS and SGSN using the SNDCP XID parameters (see clause 8).

6.5.1 Negotiation of multiple protocol control information compression types

Each SNDCP entity that supports protocol control information compression shall be able to negotiate one or several protocol control information compression entities with the compression field format shown in Figure 7. The negotiation shall be carried out using the XID parameter negotiation specified in subclause 6.8. The initiating entity defines a set of requested compression entities, together with the algorithm and parameters for each compression entity. The set of entities and their algorithms and parameters shall be transmitted to the peer entity. The peer entity responds with the set of negotiated entities and their algorithms and parameters. The peer entity shall select the proposed parameter values or other appropriate values for the negotiated entities.

6.5.1.1 Format of the protocol control information compression field

Bit	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
Octet 1	P	X	X	Entity number				
Octet 2	X	X	X	Algorithm type				
Octet 3	Length=n-3							
Octet 4	PCOMP1				PCOMP2			
…	…				…			
Octet x	High-order octet							
…	…							
Octet n	Low-order octet							

Figure 1: Protocol control information compression field format for SNDCP XID negotiation

6.5.1.1.1 Spare bit (X)

The X bit shall be set to 0 by the transmitting SNDCP entity and shall be ignored by the receiving SNDCP entity..

6.5.1.1.2 Propose bit (P)

The P bit shall be set to 1 if a new compression entity is being proposed, otherwise it shall be set to 0. If the P bit is set to 1, then all octets shall be included, otherwise octet 2 and octets 4 to x-1 shall not be included. If the P bit is set to 1, then only enough number of octets shall be included to contain the number of PCOMP values needed by the corresponding compression algorithm (e.g., PCOMP3 and PCOMP4 shall not be included if the number of PCOMP values needed by a compression algorithm is one or two). If an odd number of PCOMP values are used by a compression algorithm, then the last PCOMP value shall be set to 0 in the compression field by the transmitting SNDCP entity, and it shall be ignored by the receiving SNDCP entity.

6.5.1.1.3 Entity number

The entity number shall be used to identify a protocol control information compression entity on a SAPI. The entity number shall be assigned using the following rules:

- The entity number shall be an integer from 0 to 31.

- The entity number shall be assigned independently on each of the SAPIs.
- An entity number shall be in one of the three states: unassigned, selected, or assigned.
- When a new compression entity is to be proposed, an unassigned entity number shall become selected. If there is no unassigned entity number left, the compression entity shall not be proposed.
- A selected entity number shall become assigned if the corresponding proposed compression entity is created as a result of the XID negotiation, otherwise it shall become unassigned.
- An assigned entity number shall become unassigned when the corresponding compression entity is deleted as a result of an XID negotiation, or upon the receipt of the LL-RESET.indication primitive.
- In the case of a collision (see subclause 6.2.1.4) in which an entity number is currently selected:
  - If the selected entity number is included with the P bit set to 0 in the incoming SNDCP XID block, then it shall be assumed that the peer SNDCP entity agreed to the creation of the proposed entity but the response was lost. Therefore the selected entity number shall become assigned, any selected PCOMP and DCOMP values for the algorithm of the entity shall become assigned, and the compression entity shall be created, before the incoming SNDCP XID block is processed. After the incoming SNDCP XID block is processed, the compression entity shall be negotiated again if necessary, as defined in subclause 6.2.1.4.
  - Otherwise (i.e., if the selected entity number is not included, or is included with the P bit set to 1 in the incoming SNDCP XID block), the selected entity number shall become unassigned, and any selected PCOMP and DCOMP values for the algorithm of the entity shall become unassigned, before the incoming SNDCP XID block, if any, is processed. Following the collision resolution procedure, the originally-proposed compression entity shall be proposed again (i.e., the originally-proposed compression entity shall not be considered created even if the originally-selected entity number is proposed in the incoming SNDCP XID block) by sending the appropriate primitive (LL-ESTABLISH.request or LL-XID.request). The originally-selected entity number, PCOMP and DCOMP values shall be used for the compression entity being re-proposed if they are unassigned, otherwise a new entity number, PCOMP or DCOMP value shall be selected.
- In the case of a collision in which an entity number is currently assigned:
  - If the peer SNDCP entity proposes a new compression entity with the same entity number, then it shall be assumed that the peer SNDCP entity negotiated the deletion of the entity but the response was lost, and the entity number is being reused. Therefore the original compression entity shall be deleted, the entity number shall become unassigned, PCOMP and DCOMP values shall be unassigned if necessary (see subclause 6.5.1.1.5), and then the proposed compression entity shall be responded to as usual.
  - Otherwise (i.e., if the assigned entity number is not included, or is included with the P bit set to 0 in the incoming SNDCP XID block), the usual rules regarding collision handling shall apply.
- In the case of a collision in which a PCOMP or DCOMP value is currently assigned to a compression algorithm:
  - If the peer SNDCP entity proposes a new compression entity with the same PCOMP or DCOMP assigned to a different algorithm, then it shall be assumed that the peer SNDCP entity negotiated the deletion of all entities using the algorithm to which the PCOMP or DCOMP value was assigned, but the response was lost, and the PCOMP or DCOMP value is being reused. Therefore, all compression entities using that algorithm shall be deleted, all corresponding entity numbers shall become unassigned, and all PCOMP or DCOMP values assigned to the algorithm shall become unassigned, and then the proposed compression entity shall be responded to as usual.
  - Otherwise (i.e., if the assigned PCOMP or DCOMP is not included, or is included and assigned to the same algorithm), the usual rules regarding collision handling shall apply.

6.5.1.1.4 Algorithm type

Table 4 show the list of protocol control information compression algorithms supported by the SNDCP layer. When new compression algorithms are needed for SNDCP, Table 4 shall be updated.

Table 1: List of protocol control information compression algorithms supported by SNDCP

Compression algorithm	Algorithm type (Range 0-31)
RFC1144	0
RFC2507	1
-	Other values Reserved

6.5.1.1.5 PCOMP

One or more PCOMP values shall be assigned dynamically to a compression algorithm, based on the negotiation of the XID parameters for protocol control information compression. Each of the assigned PCOMP values denotes one compressed frame type of that compression algorithm.

The assignment of the PCOMP values follows the following general rules:

- PCOMP shall be an integer from 0 to 15.
- PCOMP value 0 is reserved permanently for no compression.
- PCOMP shall be assigned independently on each of the SAPIs.
- An assigned PCOMP value applies to all NSAPIs mapped to the same SAPI.
- PCOMP values shall be assigned to compression algorithms, not to compression entities (i.e., the same PCOMP value(s) shall be used by different compression entities on the same SAPI using the same compression algorithm).
- A PCOMP value shall be in one of the three states: unassigned, selected, or assigned.
- When a new compression entity is to be proposed, and if PCOMP values have not yet been assigned to the corresponding compression algorithm, then the appropriate number of unassigned PCOMP values shall be selected. If there is not enough unassigned PCOMP values left, the compression entity shall not be proposed.
- A selected PCOMP value shall become assigned if the corresponding proposed compression entity is created as a result of the XID negotiation, otherwise it shall become unassigned.
- An assigned PCOMP value shall become unassigned when the corresponding compression algorithm is no longer in use by any compression entity, or upon the receipt of the LL-RESET.indication primitive.
- In the case of a collision (see subclause 6.2.1.4), the handling of PCOMP values shall be in accordance with subclause 6.5.1.1.3.

While transferring data, the compressed frame type for an N-PDU is conveyed in the PCOMP field of the SNDCP header of the first SN-PDU belonging to the N-PDU. Any successfully negotiated algorithm may be used for compression of an N-PDU.

6.5.1.2 Resetting compression entities following SNDCP XID negotiation

The LL-Establish primitives shall be used for the negotiation of protocol control information compression if:

- one or more parameters, excluding the applicable NSAPIs, of existing compression entities used with acknowledged peer-to-peer LLC operation are changed by the originator of the negotiation; or
- one or more NSAPIs are removed, by the originator of the negotiation, from existing compression entities used with acknowledged peer-to-peer LLC operation, except when all NSAPIs using the compression entity are removed, or when LLC is already in ADM.

Otherwise, either the LL-Establish primitives or the LL-XID primitives may be used.

If the LL-XID primitives are used for XID negotiation, then in addition to restrictions specified elsewhere in the present document, the following parameters of the protocol control information compression entities are non-negotiable by the responding SNDCP entity:

- any parameter of existing compression entities used with acknowledged peer-to-peer LLC operation.

If one or more parameters, other than the applicable NSAPIs, of a compression entity used with unacknowledged peer-to-peer LLC operation are changed, the compression entity shall be reset locally upon completion of the SNDCP XID negotiation.

6.5.1.3 Parameters for compression entities

On negotiating a compression entity, not all the parameters of the entity have to be specified. If a parameter is to be included, all the preceding parameters shall also be specified, and the length field shall be set to the sum of the lengths of all the parameters specified. If any of the parameters is not specified, the rules in subclause 6.8.2 shall apply.

6.5.2 TCP/IP header compression (RFC1144)

The protocol control information compression method is specific for each network layer protocol type. TCP/IP (IPv4) header compression is specified in RFC 1144 [9].

6.5.2.1 Parameters

Table 5 contains the parameters defined for a compression entity using TCP/IP header compression. They may be negotiated during SNDCP XID negotiation.

Table 2: RFC 1144 TCP/IP header compression parameters

			Parameters				
Algorithm Name	**Algorithm Type**	**Length**	**Parameter Name**	**Format**	**Range**	**Sense of Negotiation**	**Default Value**
RFC 1144	0	0, 2 or 3 if P bit is 0, 1, 3 or 4 if P bit is 1.	Applicable NSAPIs	bbbbbbbb bbb00000	0, 32, 64, … , 65504	down (each bit separately)	0
			S_0 - 1	bbbbbbbb	0 through 255	down	15

6.5.2.1.1 Applicable NSAPIs

See subclause 7.1.3.

6.5.2.1.2 S_0

The number of state slots, as defined in [9]. The S_0 range is 1 through 256, with 16 as default value.

6.5.2.2 Assignment of PCOMP values

The underlying service shall be able to distinguish the three types of compressed N-PDUs (i.e., Type IP, Uncompressed TCP, and Compressed TCP), as defined in RFC 1144 [9]. These three N-PDU types are differentiated by using different PCOMP values.

Two PCOMP values shall be assigned to the TCP/IP header compression algorithm. PCOMP1 shall contain the PCOMP value for the frame type "Uncompressed TCP", and PCOMP2 shall contain the PCOMP value for the frame type "Compressed TCP".

The PCOMP value of 0 shall be used for the frame type "Type IP".

6.5.2.3 Error Recovery

When TCP/IP header compression is used with unacknowledged peer-to-peer LLC operation, the decompression entity shall be notified in case an N-PDU is dropped, so that error recovery procedure (see [9]) can be invoked.

6.5.3 TCP/IP and UDP/IP header compression (RFC 2507)

Detailed operation of the RFC 2507 header compression for IPv4 and IPv6 is described in clause 3 of the IETF specification RFC 2507 [10].

6.5.3.1 Parameters

Table 6 contains the parameters defined for a compression entity using RFC2507 header compression. They may be negotiated during SNDCP XID negotiation.

Table 6: RFC 2507 TCP/IP and UDP/IP header compression parameters

			Parameters				
Algorithm Name	**Algorithm Type**	**Length**	**Parameter Name**	**Format**	**Range**	**Sense of Negotiation**	**Default Value**
RFC 2507	1	0, 2, 4, 5, 6, 7 or 9 if P bit is 0, 3, 5, 7, 8, 9, 10 or 12 if P bit is 1.	Applicable NSAPIs	bbbbbbbb bbb00000	0, 32, 64, … , 65504	down (each bit separately)	0
			F_MAX_PERIOD	bbbbbbbb bbbbbbbb	1-65535	down ~~From compressor to decompressor~~	256
			F_MAX_TIME	bbbbbbbb	1-255	down ~~From compressor to decompressor~~	5
			MAX_HEADER	bbbbbbbb	60-255	down ~~From compressor to decompressor~~	168
			TCP_SPACE	bbbbbbbb	3-255	down ~~From compressor to decompressor~~	15
			NON_TCP_SPACE	bbbbbbbb bbbbbbbb	3-65535	down ~~From compressor to decompressor~~	15

The explanation of the individual parameters can be found in the clause 14 of the IETF specification RFC 2507 [10].

6.5.3.1.1 Applicable NSAPIs

See subclause 7.1.3.

6.5.3.2 Assignment of PCOMP values for RFC2507

The following PCOMP values shall be assigned to the RFC 2507 header compression. The PCOMP value 0 shall be used for regular IPv4 and IPv6 packets.

Table 7: PCOMP values assigned to RFC 2507 header compression algorithm

PID value	Packet type
PCOMP1	Full header
PCOMP2	Compressed TCP
PCOMP3	Compressed TCP non-delta
PCOMP4	Compressed non-TCP
PCOMP5	Context state

6.5.3.3 Error Recovery

The mechanisms related to error recovery and packet reordering are described in clauses 10 and 11 of the RFC 2507[10].

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CHANGE REQUEST

⌘ **44.065** **CR** **001** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Conditions for header compression
Source:	⌘	Siemens AG
Work item code:	⌘	GPRS
Date:	⌘	27.08.01
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	With the header compression which is described in RFC 2507 also UDP/IP header can be compressed. This CR clarifies that not only TCP/IP headers compression will be possible. In addition the clarification was done that the compressor as well as the decompressor (in the MS as well as in the SGSN) is working with the same parameter set for one NSAPI. Because of this all the header compression parameters for RFC 2507 header compression shall be from type 'down' in the 'sence of negotiation'
Summary of change:	⌘	Clarification that not only TCP/IP header compression is described in the 44.065. The sence of negotiation will be changed from 'From compressor to decompressor' to 'down' for all RFC 2507 header compression parameters.
Consequences if not approved:	⌘	Interpretation mismatches: With the current statements in the 44.065 it is not clear that also UDP/IP header compression (RFC2507) will be possible. It will be not clear which parameter set will be valid in the MS as well as in the SGSN for compression and for decompression.

Clauses affected:	⌘	6.5 and 6.5.3
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	⌘	
Other comments:	⌘	

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6.5 Protocol control information compression

Protocol control information compression is an optional SNDCP feature. ~~Only TCP/IP header compression has been specified in the present document.~~

Negotiation of the supported algorithms and their parameters is carried out between MS and SGSN using the SNDCP XID parameters (see clause 8).

6.5.1 Negotiation of multiple protocol control information compression types

Each SNDCP entity that supports protocol control information compression shall be able to negotiate one or several protocol control information compression entities with the compression field format shown in Figure 7. The negotiation shall be carried out using the XID parameter negotiation specified in subclause 6.8. The initiating entity defines a set of requested compression entities, together with the algorithm and parameters for each compression entity. The set of entities and their algorithms and parameters shall be transmitted to the peer entity. The peer entity responds with the set of negotiated entities and their algorithms and parameters. The peer entity shall select the proposed parameter values or other appropriate values for the negotiated entities.

6.5.1.1 Format of the protocol control information compression field

Bit	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
Octet 1	P	X	X	Entity number				
Octet 2	X	X	X	Algorithm type				
Octet 3	Length=n-3							
Octet 4	PCOMP1				PCOMP2			
…	…				…			
Octet x	High-order octet							
…	…							
Octet n	Low-order octet							

Figure 1: Protocol control information compression field format for SNDCP XID negotiation

6.5.1.1.1 Spare bit (X)

The X bit shall be set to 0 by the transmitting SNDCP entity and shall be ignored by the receiving SNDCP entity..

6.5.1.1.2 Propose bit (P)

The P bit shall be set to 1 if a new compression entity is being proposed, otherwise it shall be set to 0. If the P bit is set to 1, then all octets shall be included, otherwise octet 2 and octets 4 to x-1 shall not be included. If the P bit is set to 1, then only enough number of octets shall be included to contain the number of PCOMP values needed by the corresponding compression algorithm (e.g., PCOMP3 and PCOMP4 shall not be included if the number of PCOMP values needed by a compression algorithm is one or two). If an odd number of PCOMP values are used by a compression algorithm, then the last PCOMP value shall be set to 0 in the compression field by the transmitting SNDCP entity, and it shall be ignored by the receiving SNDCP entity.

6.5.1.1.3 Entity number

The entity number shall be used to identify a protocol control information compression entity on a SAPI. The entity number shall be assigned using the following rules:

- The entity number shall be an integer from 0 to 31.

- The entity number shall be assigned independently on each of the SAPIs.
- An entity number shall be in one of the three states: unassigned, selected, or assigned.
- When a new compression entity is to be proposed, an unassigned entity number shall become selected. If there is no unassigned entity number left, the compression entity shall not be proposed.
- A selected entity number shall become assigned if the corresponding proposed compression entity is created as a result of the XID negotiation, otherwise it shall become unassigned.
- An assigned entity number shall become unassigned when the corresponding compression entity is deleted as a result of an XID negotiation, or upon the receipt of the LL-RESET.indication primitive.
- In the case of a collision (see subclause 6.2.1.4) in which an entity number is currently selected:
  - If the selected entity number is included with the P bit set to 0 in the incoming SNDCP XID block, then it shall be assumed that the peer SNDCP entity agreed to the creation of the proposed entity but the response was lost. Therefore the selected entity number shall become assigned, any selected PCOMP and DCOMP values for the algorithm of the entity shall become assigned, and the compression entity shall be created, before the incoming SNDCP XID block is processed. After the incoming SNDCP XID block is processed, the compression entity shall be negotiated again if necessary, as defined in subclause 6.2.1.4.
  - Otherwise (i.e., if the selected entity number is not included, or is included with the P bit set to 1 in the incoming SNDCP XID block), the selected entity number shall become unassigned, and any selected PCOMP and DCOMP values for the algorithm of the entity shall become unassigned, before the incoming SNDCP XID block, if any, is processed. Following the collision resolution procedure, the originally-proposed compression entity shall be proposed again (i.e., the originally-proposed compression entity shall not be considered created even if the originally-selected entity number is proposed in the incoming SNDCP XID block) by sending the appropriate primitive (LL-ESTABLISH.request or LL-XID.request). The originally-selected entity number, PCOMP and DCOMP values shall be used for the compression entity being re-proposed if they are unassigned, otherwise a new entity number, PCOMP or DCOMP value shall be selected.
- In the case of a collision in which an entity number is currently assigned:
  - If the peer SNDCP entity proposes a new compression entity with the same entity number, then it shall be assumed that the peer SNDCP entity negotiated the deletion of the entity but the response was lost, and the entity number is being reused. Therefore the original compression entity shall be deleted, the entity number shall become unassigned, PCOMP and DCOMP values shall be unassigned if necessary (see subclause 6.5.1.1.5), and then the proposed compression entity shall be responded to as usual.
  - Otherwise (i.e., if the assigned entity number is not included, or is included with the P bit set to 0 in the incoming SNDCP XID block), the usual rules regarding collision handling shall apply.
- In the case of a collision in which a PCOMP or DCOMP value is currently assigned to a compression algorithm:
  - If the peer SNDCP entity proposes a new compression entity with the same PCOMP or DCOMP assigned to a different algorithm, then it shall be assumed that the peer SNDCP entity negotiated the deletion of all entities using the algorithm to which the PCOMP or DCOMP value was assigned, but the response was lost, and the PCOMP or DCOMP value is being reused. Therefore, all compression entities using that algorithm shall be deleted, all corresponding entity numbers shall become unassigned, and all PCOMP or DCOMP values assigned to the algorithm shall become unassigned, and then the proposed compression entity shall be responded to as usual.
  - Otherwise (i.e., if the assigned PCOMP or DCOMP is not included, or is included and assigned to the same algorithm), the usual rules regarding collision handling shall apply.

6.5.1.1.4 Algorithm type

Table 4 show the list of protocol control information compression algorithms supported by the SNDCP layer. When new compression algorithms are needed for SNDCP, Table 4 shall be updated.

Table 1: List of protocol control information compression algorithms supported by SNDCP

Compression algorithm	Algorithm type (Range 0-31)
RFC1144	0
RFC2507	1
-	Other values Reserved

6.5.1.1.5 PCOMP

One or more PCOMP values shall be assigned dynamically to a compression algorithm, based on the negotiation of the XID parameters for protocol control information compression. Each of the assigned PCOMP values denotes one compressed frame type of that compression algorithm.

The assignment of the PCOMP values follows the following general rules:

- PCOMP shall be an integer from 0 to 15.
- PCOMP value 0 is reserved permanently for no compression.
- PCOMP shall be assigned independently on each of the SAPIs.
- An assigned PCOMP value applies to all NSAPIs mapped to the same SAPI.
- PCOMP values shall be assigned to compression algorithms, not to compression entities (i.e., the same PCOMP value(s) shall be used by different compression entities on the same SAPI using the same compression algorithm).
- A PCOMP value shall be in one of the three states: unassigned, selected, or assigned.
- When a new compression entity is to be proposed, and if PCOMP values have not yet been assigned to the corresponding compression algorithm, then the appropriate number of unassigned PCOMP values shall be selected. If there is not enough unassigned PCOMP values left, the compression entity shall not be proposed.
- A selected PCOMP value shall become assigned if the corresponding proposed compression entity is created as a result of the XID negotiation, otherwise it shall become unassigned.
- An assigned PCOMP value shall become unassigned when the corresponding compression algorithm is no longer in use by any compression entity, or upon the receipt of the LL-RESET.indication primitive.
- In the case of a collision (see subclause 6.2.1.4), the handling of PCOMP values shall be in accordance with subclause 6.5.1.1.3.

While transferring data, the compressed frame type for an N-PDU is conveyed in the PCOMP field of the SNDCP header of the first SN-PDU belonging to the N-PDU. Any successfully negotiated algorithm may be used for compression of an N-PDU.

6.5.1.2 Resetting compression entities following SNDCP XID negotiation

The LL-Establish primitives shall be used for the negotiation of protocol control information compression if:

- one or more parameters, excluding the applicable NSAPIs, of existing compression entities used with acknowledged peer-to-peer LLC operation are changed by the originator of the negotiation; or
- one or more NSAPIs are removed, by the originator of the negotiation, from existing compression entities used with acknowledged peer-to-peer LLC operation, except when all NSAPIs using the compression entity are removed, or when LLC is already in ADM.

Otherwise, either the LL-Establish primitives or the LL-XID primitives may be used.

If the LL-XID primitives are used for XID negotiation, then in addition to restrictions specified elsewhere in the present document, the following parameters of the protocol control information compression entities are non-negotiable by the responding SNDCP entity:

- any parameter of existing compression entities used with acknowledged peer-to-peer LLC operation.

If one or more parameters, other than the applicable NSAPIs, of a compression entity used with unacknowledged peer-to-peer LLC operation are changed, the compression entity shall be reset locally upon completion of the SNDCP XID negotiation.

6.5.1.3 Parameters for compression entities

On negotiating a compression entity, not all the parameters of the entity have to be specified. If a parameter is to be included, all the preceding parameters shall also be specified, and the length field shall be set to the sum of the lengths of all the parameters specified. If any of the parameters is not specified, the rules in subclause 6.8.2 shall apply.

6.5.2 TCP/IP header compression (RFC1144)

The protocol control information compression method is specific for each network layer protocol type. TCP/IP (IPv4) header compression is specified in RFC 1144 [9].

6.5.2.1 Parameters

Table 5 contains the parameters defined for a compression entity using TCP/IP header compression. They may be negotiated during SNDCP XID negotiation.

Table 2: RFC 1144 TCP/IP header compression parameters

			Parameters				
Algorithm Name	**Algorithm Type**	**Length**	**Parameter Name**	**Format**	**Range**	**Sense of Negotiation**	**Default Value**
RFC 1144	0	0, 2 or 3 if P bit is 0, 1, 3 or 4 if P bit is 1.	Applicable NSAPIs	bbbbbbbb bbb00000	0, 32, 64, … , 65504	down (each bit separately)	0
			S_0 - 1	bbbbbbbb	0 through 255	down	15

6.5.2.1.1 Applicable NSAPIs

See subclause 7.1.3.

6.5.2.1.2 S_0

The number of state slots, as defined in [9]. The S_0 range is 1 through 256, with 16 as default value.

6.5.2.2 Assignment of PCOMP values

The underlying service shall be able to distinguish the three types of compressed N-PDUs (i.e., Type IP, Uncompressed TCP, and Compressed TCP), as defined in RFC 1144 [9]. These three N-PDU types are differentiated by using different PCOMP values.

Two PCOMP values shall be assigned to the TCP/IP header compression algorithm. PCOMP1 shall contain the PCOMP value for the frame type "Uncompressed TCP", and PCOMP2 shall contain the PCOMP value for the frame type "Compressed TCP".

The PCOMP value of 0 shall be used for the frame type "Type IP".

6.5.2.3 Error Recovery

When TCP/IP header compression is used with unacknowledged peer-to-peer LLC operation, the decompression entity shall be notified in case an N-PDU is dropped, so that error recovery procedure (see [9]) can be invoked.

6.5.3 TCP/IP and UDP/IP header compression (RFC 2507)

Detailed operation of the RFC 2507 header compression for IPv4 and IPv6 is described in clause 3 of the IETF specification RFC 2507 [10].

6.5.3.1 Parameters

Table 6 contains the parameters defined for a compression entity using RFC2507 header compression. They may be negotiated during SNDCP XID negotiation.

Table 6: RFC 2507 TCP/IP and UDP/IP header compression parameters

			Parameters				
Algorithm Name	**Algorithm Type**	**Length**	**Parameter Name**	**Format**	**Range**	**Sense of Negotiation**	**Default Value**
RFC 2507	1	0, 2, 4, 5, 6, 7 or 9 if P bit is 0, 3, 5, 7, 8, 9, 10 or 12 if P bit is 1.	Applicable NSAPIs	bbbbbbbb bbb00000	0, 32, 64, … , 65504	down (each bit separately)	0
			F_MAX_PERIOD	bbbbbbbb bbbbbbbb	1-65535	down ~~From compressor to decompressor~~	256
			F_MAX_TIME	bbbbbbbb	1-255	down ~~From compressor to decompressor~~	5
			MAX_HEADER	bbbbbbbb	60-255	down ~~From compressor to decompressor~~	168
			TCP_SPACE	bbbbbbbb	3-255	down ~~From compressor to decompressor~~	15
			NON_TCP_SPACE	bbbbbbbb bbbbbbbb	3-65535	down ~~From compressor to decompressor~~	15

The explanation of the individual parameters can be found in the clause 14 of the IETF specification RFC 2507 [10].

6.5.3.1.1 Applicable NSAPIs

See subclause 7.1.3.

6.5.3.2 Assignment of PCOMP values for RFC2507

The following PCOMP values shall be assigned to the RFC 2507 header compression. The PCOMP value 0 shall be used for regular IPv4 and IPv6 packets.

Table 7: PCOMP values assigned to RFC 2507 header compression algorithm

PID value	Packet type
PCOMP1	Full header
PCOMP2	Compressed TCP
PCOMP3	Compressed TCP non-delta
PCOMP4	Compressed non-TCP
PCOMP5	Context state

6.5.3.3 Error Recovery

The mechanisms related to error recovery and packet reordering are described in clauses 10 and 11 of the RFC 2507[10].