INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Q.50.2

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(12/2002)

SERIES Q: SWITCHING AND SIGNALLING

International automatic and semi-automatic working – Signalling for circuit multiplication equipment

Signalling between International Switching Centres (ISC) and Digital Circuit Multiplication Equipment (DCME) including the control of compression/decompression over an IP network

ITU-T Recommendation Q.50.2

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
Basic Recommendations	Q.4–Q.9
Numbering plan and dialling procedures in the international service	Q.10–Q.11
Routing plan for international service	Q.12–Q.19
General Recommendations relative to signalling and switching systems (national or international)	Q.20–Q.34
Tones for use in national signalling systems	Q.35–Q.39
General characteristics for international telephone connections and circuits	Q.40–Q.47
Signalling for satellite systems	Q.48–Q.49
Signalling for circuit multiplication equipment	**Q.50–Q.59**
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEM No. 4	Q.120–Q.139
SPECIFICATIONS OF SIGNALLING SYSTEM No. 5	Q.140–Q.199
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
PUBLIC LAND MOBILE NETWORK	Q.1000-Q.1099
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.799
Q3 INTERFACE	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC)	Q.1900–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation Q.50.2

Signalling between International Switching Centres (ISC) and Digital Circuit Multiplication Equipment (DCME) including the control of compression/decompression over an IP network

Summary

This Recommendation describes a signalling interface between an International Switching Centre (ISC) and a Digital Circuit Multiplication Equipment (DCME) that has the additional (compared to ITU-T Rec. Q.50) capability to control the compression/decompression function of the DCME. This signalling interface provides for the call by call control of a DCME in real time.

The difference between this Recommendation and ITU-T Rec. Q.50.1 is that the DCME control protocol is supported over an IP network.

Source

ITU-T Recommendation Q.50.2 (2002) was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 29 December 2002.

Keywords

Compression/decompression, DCME, IP Networks.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

ITU-T Recommendation Q.50.2

Signalling between International Switching Centres (ISC) and Digital Circuit Multiplication Equipment (DCME) including the control of compression/decompression over an IP Network

1 Scope

This Recommendation describes a signalling interface between an International Switching Centre (ISC) and a Digital Circuit Multiplication Equipment (DCME) with a built-in device controller that allows a per call control of various functions in the DCME in real time. It is based on the interface described in ITU-T Rec. Q.50 [1]. In addition to the functions described in [1] that can be controlled by the switch, the compression/decompression function in the DCME can also be controlled over an IP network.

The DCME is of type 2 (see ITU-T Rec. Q.50 [1]).

This interface is supported in E1-networks.

The signalling interface defined in this Recommendation assumes a fixed relationship between the circuits of the ISC and the DCME. This signalling interface is supported over an IP network.

While this Recommendation is intended for use on international networks, the information defined here may be used within national networks.

2 References

2.1 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[1] ITU-T Recommendation Q.50 (2001), *Signalling between Circuit Multiplication Equipment (CME) and International Switching Centres (ISC)*.

[2] ITU-T Recommendation Q.50.1 (2001), *Signalling between International Switching Centres (ISC) and Digital Circuit Multiplication Equipment (DCME) including the control of compression/decompression*.

[3] ITU-T Recommendation G.763 (1998), *Digital circuit multiplication equipment using G.726 ADPCM and digital speech interpolation*.

[4] ITU-T Recommendation G.767 (1998), *Digital circuit multiplication equipment using 16 kbit/s LD-CELP, digital speech interpolation and facsimile demodulation/remodulation*.

[5] ITU-T Recommendation G.768 (2001), *Digital circuit multiplication equipment using 8 kbit/s CS-ACELP*.

[6] ITU-T Recommendation G.704 (1998), *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*.

2.2 Bibliography

The documents listed in this clause provide informative background material for the reader and are not normative within this Recommendation.

[7] IEEE 802 (2001), *IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture*.

3 Definitions

This Recommendation defines the following terms:

3.1 E1 facility: A transmission link operating at 2048 kbit/s, supporting 30 or 31 64 kbit/s channels.

3.2 external: A device is called external, when it is located outside of the switch.

4 Abbreviations

This Recommendation uses the following abbreviations:

CCF	Call Control Function
DCME	Digital Circuit Multiplication Equipment
DCMECF	DCME control function
DCMESF	DCME switching function
ISC	International Switching Centre
IP	Internet Protocol
UDP	User Datagram Protocol

5 Requirements

The protocol used between the ISC and the DCME must include the control signals/messages for the control of the compression/decompression function in the DCME. The interface is supported over an IP network.

6 Conceptual model

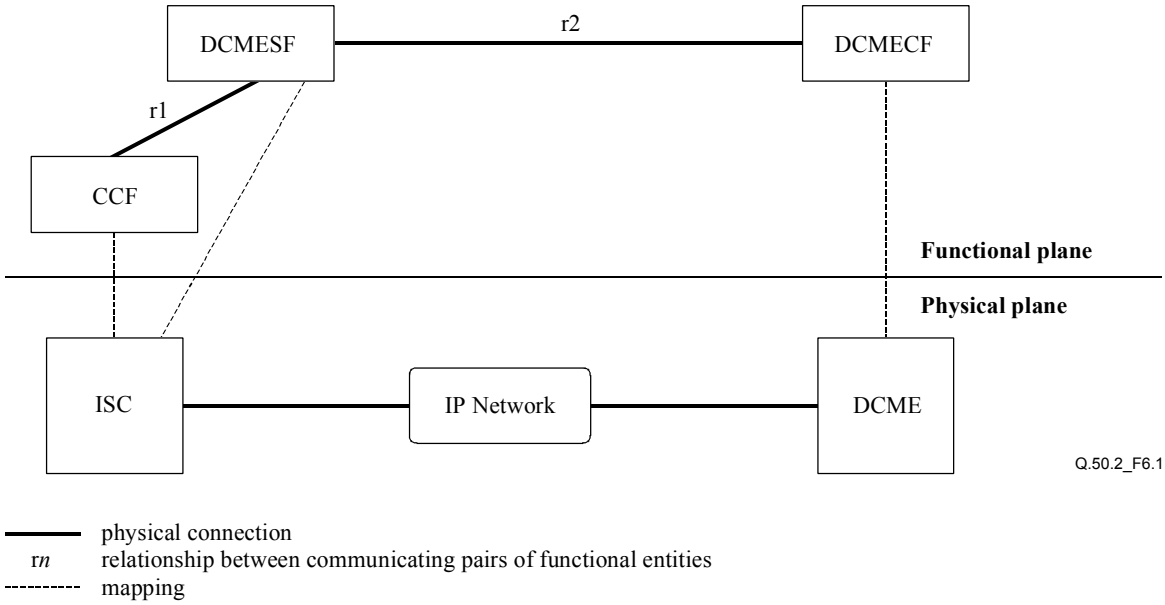


Figure 6-1/Q.50.2 – Conceptual methodology model

A master slave relation exists between the DCME switching function (located in the switch) and the DCME control function (located in the DCME).

7 Network architecture

7.1 E1 and IP network-based interface

The DCME has a physical interface according to ITU-T Rec. G.704 [6] which allows the DCME to be inserted in an E1 transmission facility. The network architecture deals with where DCME equipment is located in the network. The control info is transmitted over an IP network.

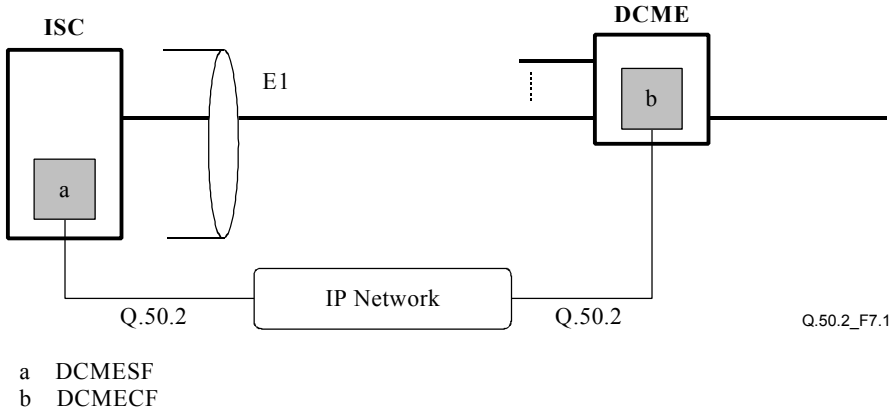
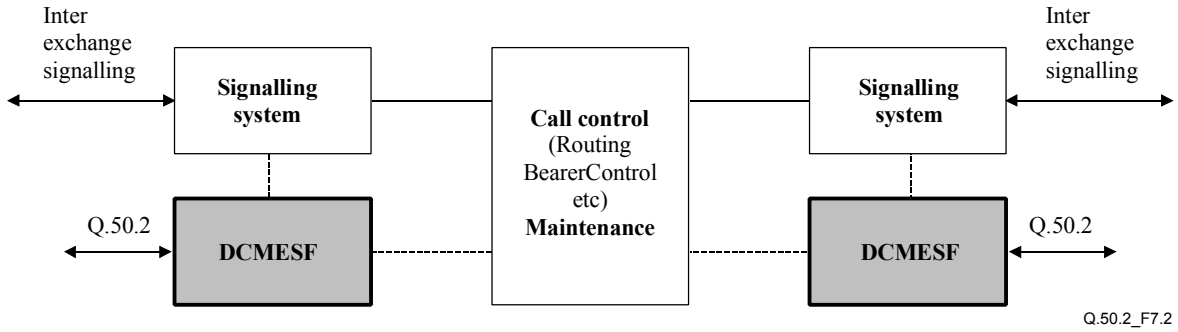


Figure 7-1/Q.50.2 – ISC-DCME interface in an IP-network

7.2 International switching centre

The ISC provides an E1 circuit interface and a control interface. The ISC also provides the logic to decide on a per call basis the control info to be sent to the DCME. The control info is conveyed to the DCME over an IP network.



NOTE – Communication between DCMESF and Call Control can either be direct or via the Signalling System Process

Figure 7-2/Q.50.2 – Process diagram

7.3 Digital circuit multiplication equipment

The DCME provides an E1 circuit interface and an IP Network-based control interface. The control info is transmitted over an IP network. The compression/decompression function can be enabled/disabled for each circuit individually.

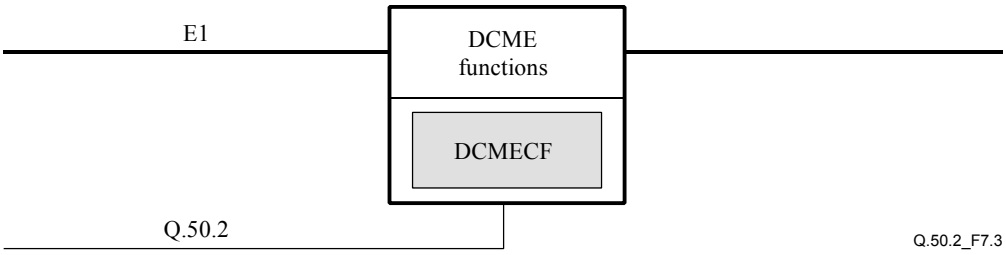


Figure 7-3/Q.50.2 – Digital circuit multiplication equipment

8 Protocol

The DCME control protocol is transported using UDP, as shown in Figure 7-4.

Any Port number in the Dynamic and/or Private range (49 152 through 65 535) may be used.

Q.50.2 (DCME control protocol)
UDP (User Datagram Protocol)
IP (Internet Protocol)

Figure 7-4/Q.50.2 – Transport of the DCME control protocol over IP

8.1 Information elements

The information elements supported by this Recommendation are the same as in ITU-T Rec. Q.50 [1] added by those contained in Table 1.

Table 1/Q.50.2 – Information elements for the control of compression/decompression

Type of information element		Notes	Direction of the information element
1.1	compression/decompression not allowed	Sent to inform the "outgoing" DCME do not compress/ decompress the bit stream, when a 3.1 kHz/speech select/seizure was sent to the DCME	ISC → DCME
1.2	decompression/compression not allowed	Sent to inform the "incoming" DCME do not decompress/ compress the bit stream	ISC → DCME

8.2 SDL

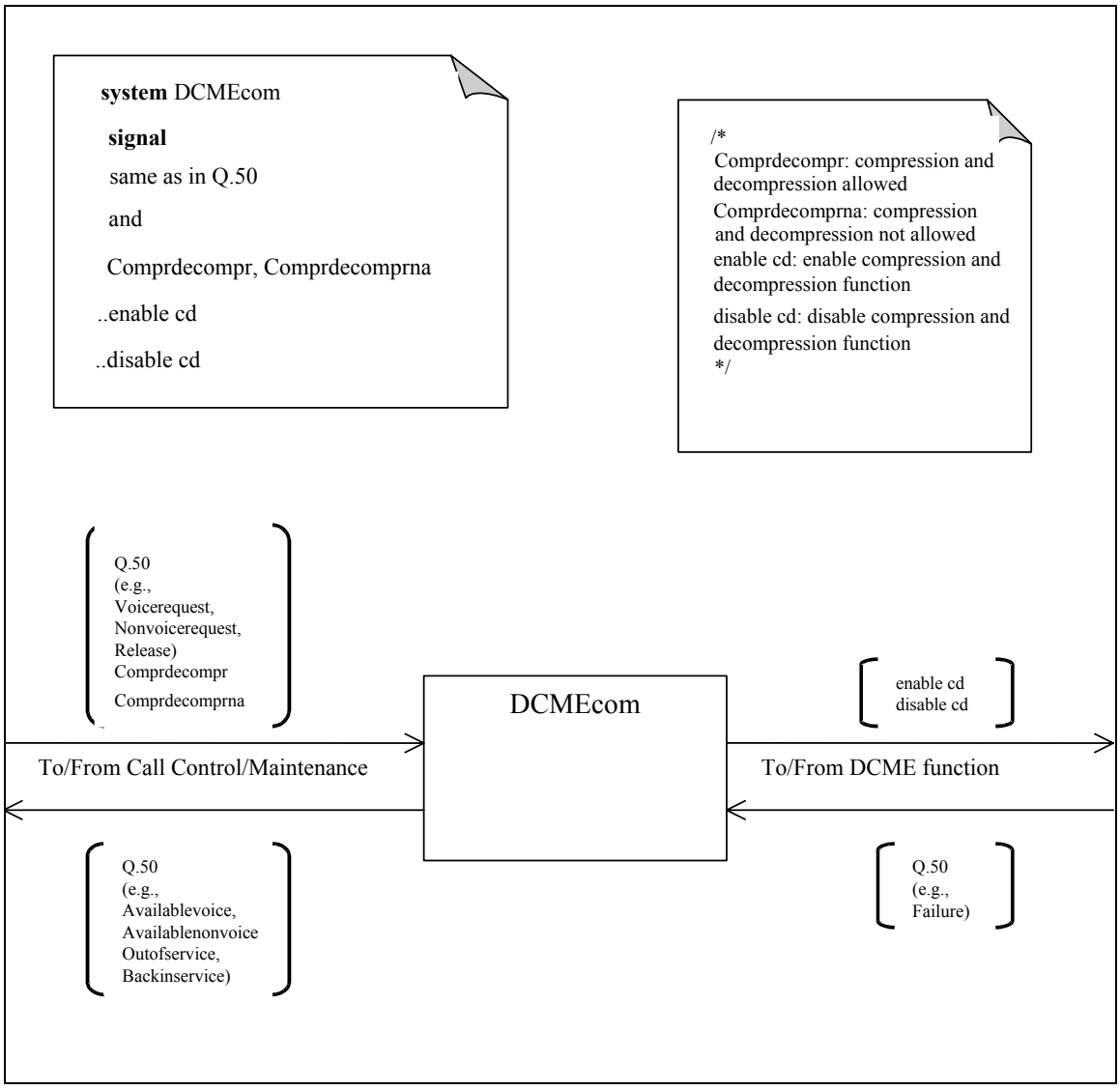


Figure 8-1/Q.50.2 – System "DCME communication"

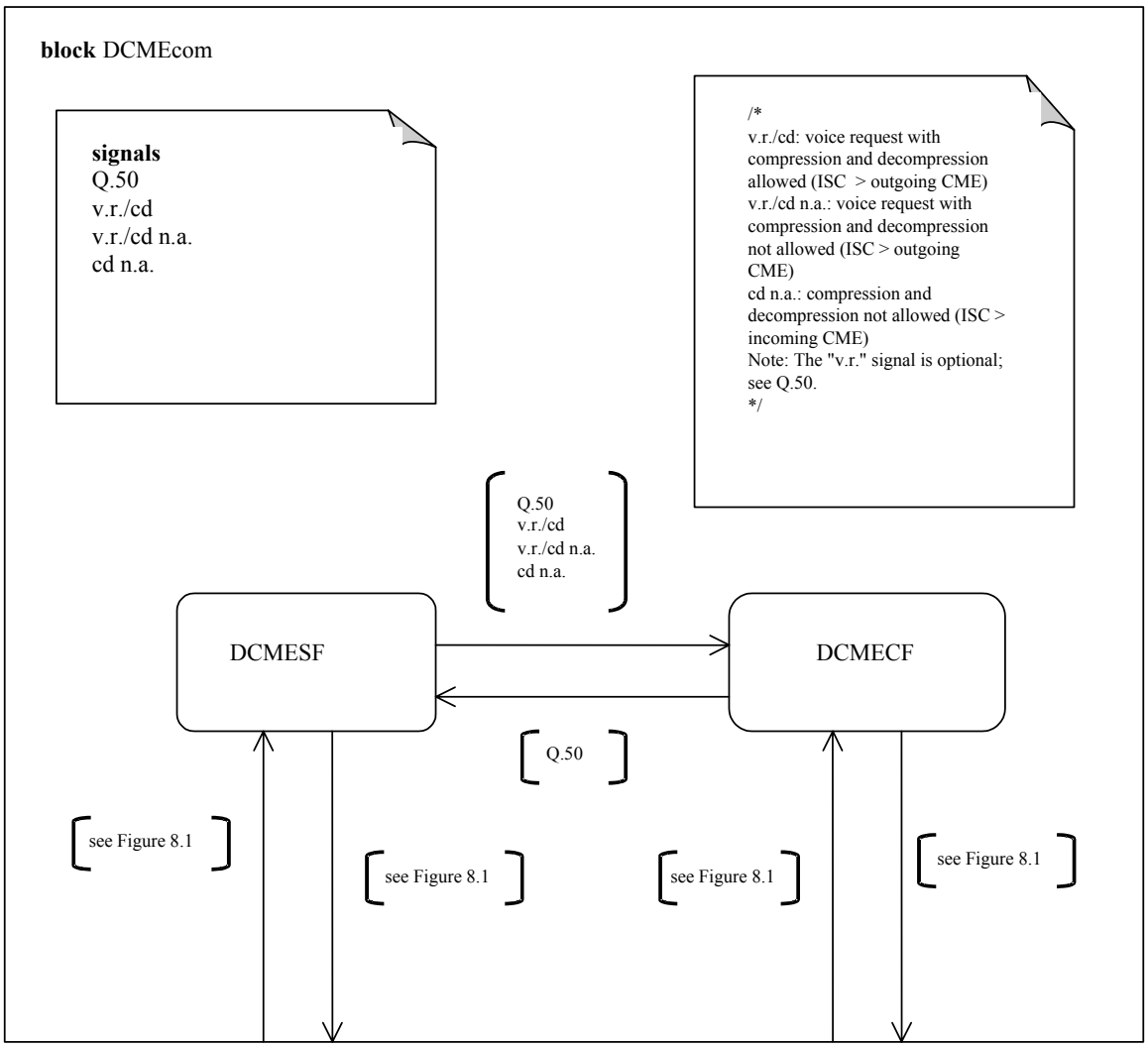


Figure 8-2/Q.50.2 – Block "DCMEcommunication"

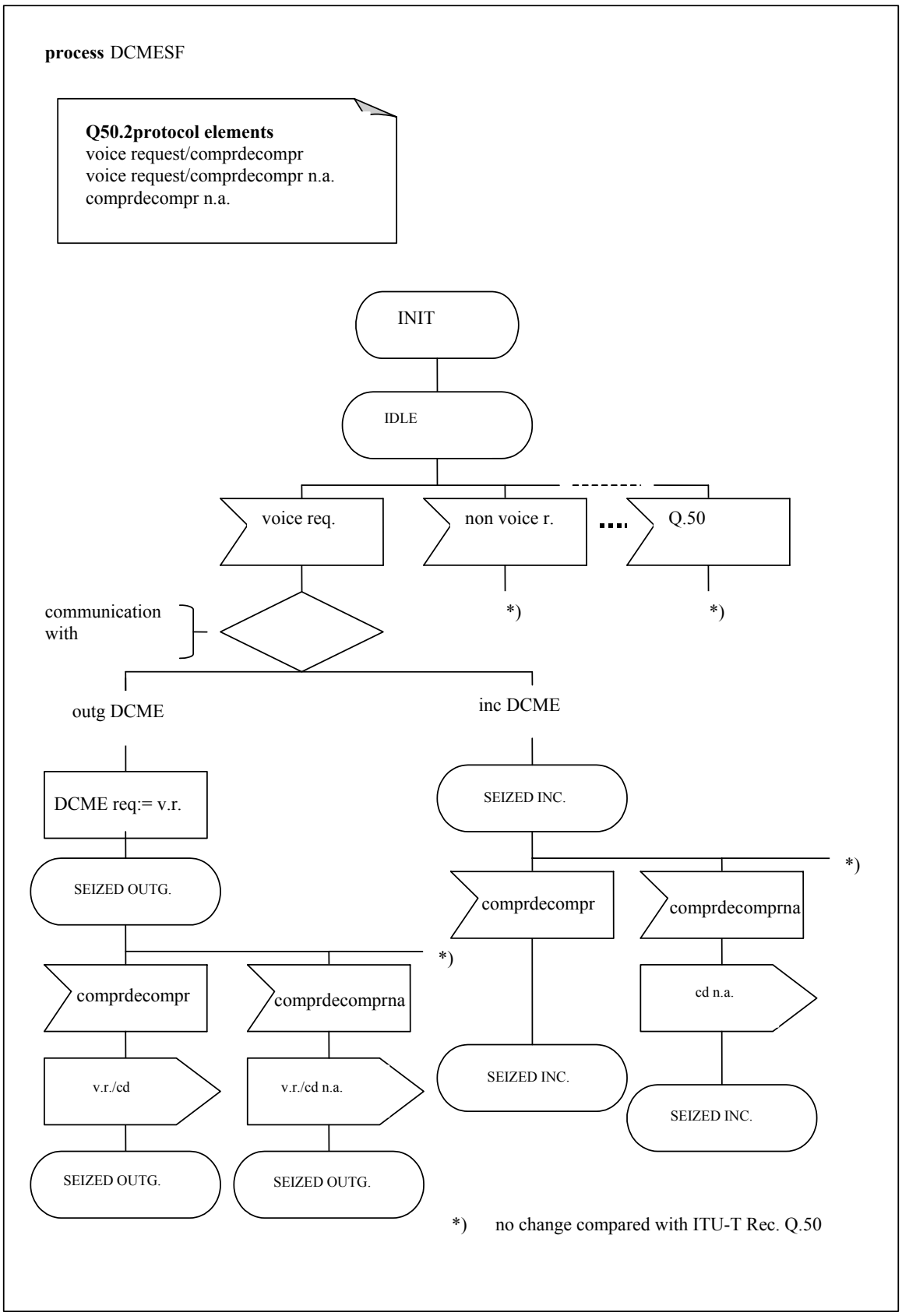


Figure 8-3/Q.50.2 – "Process DCMESF"

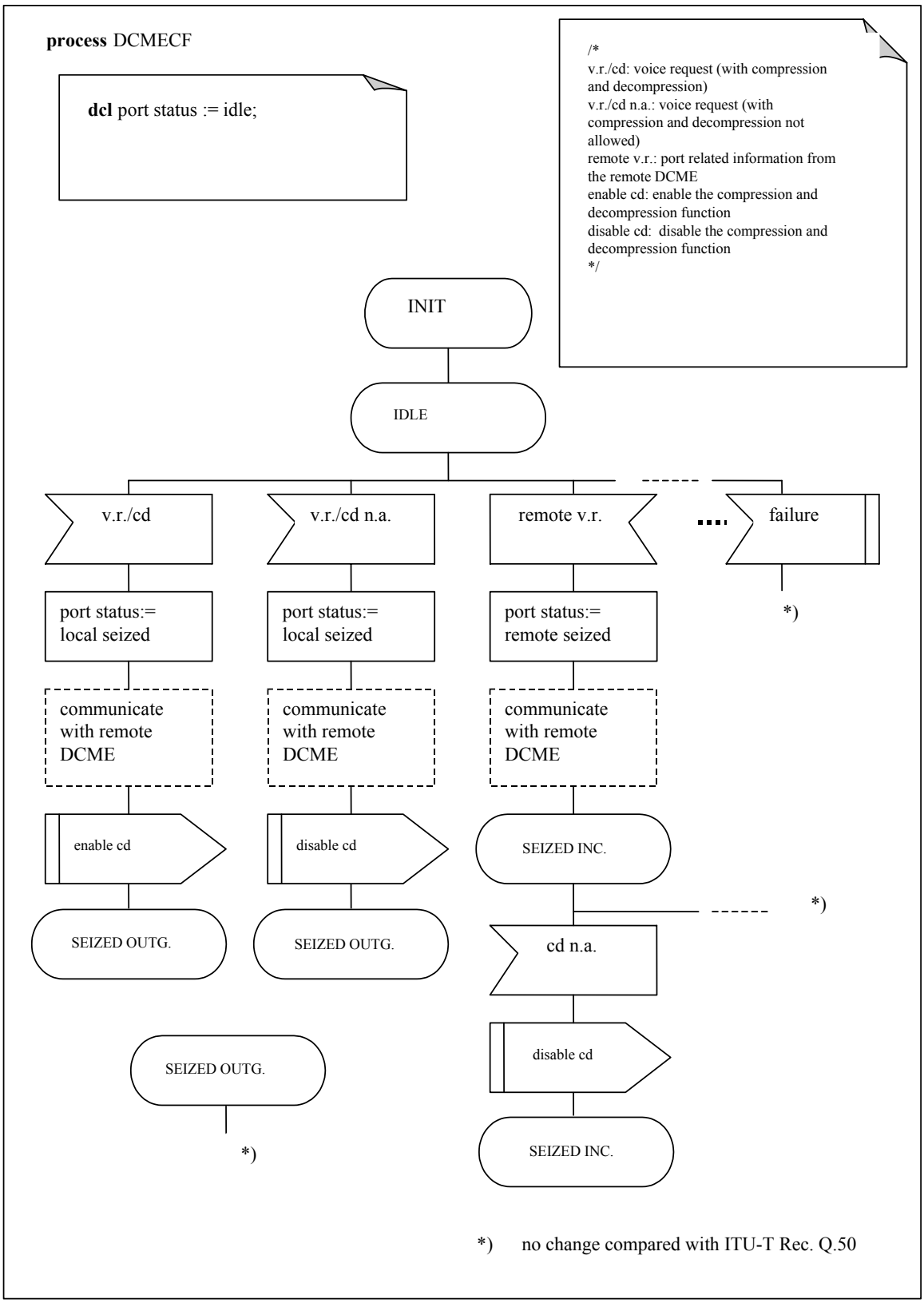


Figure 8-4/Q.50.2 – "Process DCMECF"

Annex A

Signalling interface

A.1 Detailed protocol description

A.1.1 Message format

The DCME Control Message is sent over the IP interface to control DCME. Routing of the Control messages to a specific DCME will be performed by the ISC using facility tables.

The DCME Control Message contains five octets as follows:

Message format

Table A.1/Q.50.2 – Message format

Bits								
7	6	5	4	3	2	1	0	Octet
Value = 0001 All other values are reserved				Direction		Value = 00 All other values are reserved		1
Value = 0000 All other values are reserved				Signals mode				2
E1 Facility identifier (Most significant bit)								3
E1 Facility identifier (Least significant bit)								4
Channel identifier								5

In the above message format, bit 7 is the Most Significant Bit (MSB) that is transmitted first.

The Facility identifier represents individual E1 facilities, and Channel identifier represents the identifier of the channel within the Facility.

A.1.2 Coding

Octet 1

Table A.2/Q.50.2 – Octet 1

Bits 7 6 5 4	Bits 3 2 Direction	Bits 1 0
0 0 0 1 All other values are reserved	0 1 Sent by DCME 1 0 Sent by ISC All other values are reserved	0 0 All other values are reserved

Octet 2

Table A.3/Q.50.2 – Octet 2

Bits 7 6 5 4	Bits 3 2 1 0 Signals mode
0 0 0 0 All other values are reserved	(see Table A.4) Direction = Sent by DCME Bit0 = a_b, Bit1 = b_b, Bit2 = Not used, Bit3 = d_b Direction = Sent by ISC Bit0 = a_f, Bit1 = b_f, Bit2 = Not used, Bit3 = d_f

NOTE – For the meaning of bits a_b, a_f , b_b, b_f, d_b, d_f, see ITU-T Rec. Q.50.1 [2].

Signals mode is coded as shown in Table A.4.

Table A.4/Q.50.2 – Signals mode

Signal No.	**Type of signal**	**Direction ISC-DCME**	**Signals Mode** (Note 2)		**Group of information element**
			Sent by ISC **0 1 3**	**Sent by DCME** **0 1 3**	
1	Circuit available for 64 kbit/s	←	*1 0 1*	1 0 1	
2	Circuit available for 3.1 kHz data, speech	←	*1 0 1*	0 1 1	Load control
3	Circuit not available	←	*1 0 1*	0 0 1	
4	64 kbit/s seizure	→	1 1 1	*1 0 1*	
5	3.1 kHz/speech seizure	→	0 1 1	*0 1 1*	
		→	(0 1 1	*1 0 1*) (Note 1)	
6	64 kbit/s positive acknowledgement	←	*1 1 1*	0 1 1	
7	3.1 kHz/speech positive acknowledgement	←	*0 1 1*	1 0 1	Seizure release
		←	*0 1 0*	1 0 1	
		←	(*0 1 1*	0 1 1) (Note 1)	
8	Release 64 kbit/s	→	1 0 1	*0 1 1*	
9	Release 3.1 kHz/speech	→	1 0 1	*1 0 1*	
		→	(1 0 1	*0 1 1*) (Note 1)	
10	Maintenance release signal (after 3.1 kHz, speech seizure)	←	*0 1 1*	0 0 1	
11	Maintenance release signal (after 64 kbit/s seizure)	←	*1 1 1*	0 0 1	
12	Maintenance release acknowledgement	→	0 0 1	*0 0 1*	
13	CME clear of traffic	→	1 0 1	*0 0 1*	Maintenance

Table A.4/Q.50.2 – Signals mode

Signal No.	Type of signal		Direction ISC-DCME	Signals Mode (Note 2)		Group of information element
				Sent by ISC 0 1 3	Sent by DCME 0 1 3	
14	Out-of-service	a	←———	*0 0 1*	1 1 1	
		b	←———	*0 1 1*	1 1 1	
		c	←———	*1 0 1*	1 1 1	
		d	←———	*1 1 1*	1 1 1	
15	Out-of-service acknowledgement		———→	0 0 1	*1 1 1*	
16	Back-in-service		←———	*0 0 1*	0 1 1	
17	3.1 kHz/speech seizure and compression/decompression not allowed		———→	0 1 0	*0 1 1*	Compression and decompression
			———→	(0 1 0	*1 0 1*) (Note 1)	Control
18	decompression/compression not allowed		———→	(1 0 0	*1 0 1*) (Note 1)	
			———→	1 0 0	*0 1 1*	

NOTE 1 – This bit combination is required only if 3.1 kHz/speech seizure is to be permitted for circuits marked available for 64 kbit/s.

NOTE 2 – The signal mode illustrated in italics represents the signal mode that was sent earlier by the partner side. Bit 2 not used (set to "0").

Signals 1 to 16 are the same as in Annex B/Q.50 [1]; with the d-bit = 1.

Signals 17 and 18 are used for the Compression and Decompression control. If, on both the incoming circuit and the outgoing circuit, DCMEs are present and use the same coding for compression, the DCMEs on the incoming and on the outgoing circuit will be informed that compression and decompression are not allowed. Signal 17 is sent to the outgoing DCME and signal 18 is sent to the incoming DCME.

The DCME when receiving signal 17 or 18 will not apply the compression/decompression function for that circuit.

Octets 3 and 4

Table A.5/Q.50.2 – Octet 3 and 4

Bits							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1
			.				
			.				
1	1	1	1	1	1	1	1

Bits							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1
			.				
			.				
1	1	1	1	1	1	1	1

Octets 3 and 4 are used to contain the Facility identifier of the channel being addressed. This provides the capability to identify up to 65 536 (i.e., 2^{16}) E1 Facilities. Facility identifier starts from value 0.

Octets 5

Table A.6/Q.50.2 – Octet 5

Bits							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1
			.				
			.				
1	1	1	1	1	1	1	1

Octet 5 is used to contain the Channel identifier of the channel within the Facility identified using the Facility identifier indicated in octets 3 and 4. Channel identifier starts from value 0.

An example is provided in Table A.7 to illustrate the usage of the above defined message format.

Table A.7/Q.50.2 – Example of DCME control message

(MSB) 7	6	5	4	3	2	1	0	Octet
0	0	0	1	0	1	0	0	1
				(direction)				
0	0	0	0	1	0	0	1	2
					(Signals mode)			
0	0	0	0	0	0	0	0	3
			(facility identifier)					
0	0	0	0	0	1	0	1	4
			(facility identifier)					
0	0	0	0	1	1	0	1	5
			(channel identifier)					

The values in the different octets of the above message are as follows:

Octet 1: Bits 3 and 2 define the direction that the DCME control needs to be applied to which in this case is sent by DCME.

Octet 2: Bits 3 through 0 imply the Signals mode.

Octets 3 and 4: These octets together indicate the identifier of the E1 facility, which in this case is 5.

Octet 5: The value in this octet indicates that the channel being identified is channel number 13.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland
Geneva, 2003