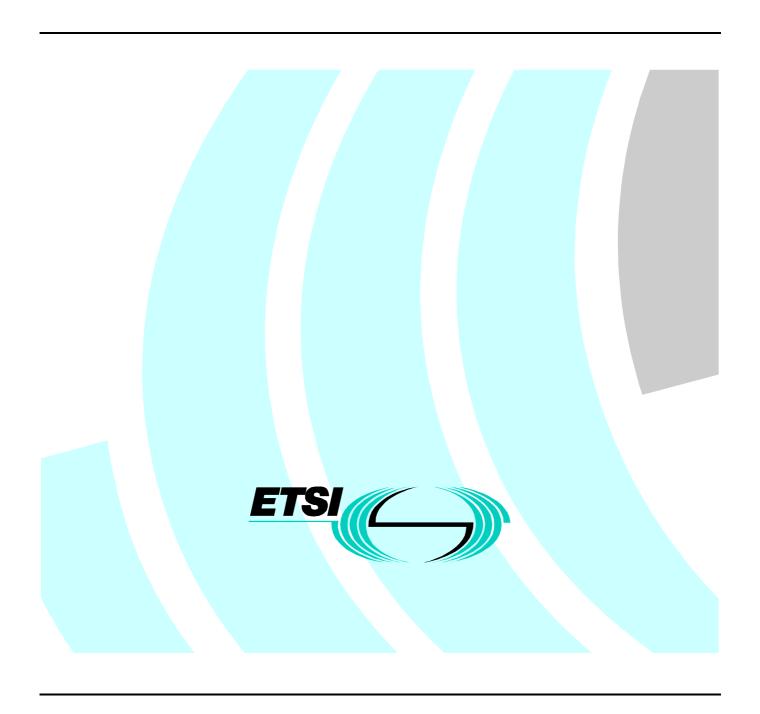Final draft ETSI EN 300 462-4-2 V1.1.1 (1999-10)

European Standard (Telecommunications series)

Transmission and Multiplexing (TM);
Generic requirements for synchronization networks;
Part 4-2: Timing characteriztics of slave clocks suitable
for synchronization supply to Synchronous Digital Hierarchy
(SDH) and Plesiochronous Digital Hierarchy (PDH) equipment;
Implementation Conformance Statement (ICS)
proforma specification

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM), and is now submitted for the Voting phase of the ETSI standards Two-step Approval Procedure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a telecommunication specification. Such a statement is called an Implementation Conformance Statement (ICS).

The ICS proforma is not another complete description of the related specification, but rather a compact form of its static conformance requirements, to be used by the test laboratory to identify which test shall be performed on a given implementation. Not every feature of a profile specification is contained in the related ICS proforma. For particular cases requiring specific information the ICS can refer to the appropriate clause of the related specification by means of references, notes and or comments.

1 Scope

The present document provides the Implementation Conformance Statement (ICS) proforma specification for the synchronization network generic requirements defined in EN 300 462-4-1 [4] in compliance with the relevant requirements, and in accordance with the relevant guidance given in ISO/IEC 9646-7 [9] and ETS 300 406 [7].

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.

[1] EN 300 462-1-1: "Transmission and Multiplexing (TM); Generic requirements for synchronisation networks; Part 1: Definitions and terminology for synchronisation networks".

[2] EN 300 462-2-1: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 2-1: Synchronization network architecture".

[3] EN 300 462-3-1: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 3-1: The control of jitter and wander within synchronization networks".

[4] EN 300 462-4-1: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 4-1: Timing characteristics of slave clocks suitable for synchronization supply to Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) equipment".

[5] EN 300 462-5-1: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 5-1: Timing characteristics of slave clocks suitable for operation in Synchronous Digital Hierarchy (SDH) equipment".

[6] EN 300 462-6-1: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 6-1: Timing characteristics of primary reference clocks".

[7] ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[8] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

[9] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".

[10] ITU-T Recommendation O.172: "Jitter and wander measuring equipment for digital systems which are based on the synchronous digital hierarchy (SDH)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

- terms defined in EN 300 462 [1] to [6];

- terms defined in ISO/IEC 9646-1 [8] and in ISO/IEC 9646-7 [9].

In particular, the following terms defined in ISO/IEC 9646-1 [8] apply:

Implementation Conformance Statement (ICS): statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented. The ICS can take several forms: protocol ICS, profile ICS, profile specific ICS, information object ICS, etc.

ICS proforma: document, in the form of a questionnaire, which when completed for an implementation or system becomes an ICS.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ICS	Implementation Conformance Statement
IUT	Implementation Under Test
MTIE	Maximum Time Interval Error
PDH	Plesiochronous Digital Hierarchy
ppm	parts per million
SASE	Stand Alone Synchronization Equipment
SCS	System Conformance Statement
SDH	Synchronous Digital Hierarchy
SSU	Synchronization Supply Unit
STM-N	Synchronous Transport Module-N
SUT	System Under Test
TDEV	Time DEViation
UI	Unit Interval
UIpp	Unit Interval peak to peak

A full list of abbreviations used in timing and synchronization is listed in EN 300 462-1-1 [1].

3.3 Symbols

For the purposes of the present document, the following symbols apply:

K	Kelvin
τ	Tau

4   Conformance to this ICS proforma specification

If it claims to conform to the present document, the actual ICS proforma to be filled in by a supplier shall be technically equivalent to the text of the ICS proforma given in annex A, and shall preserve the numbering/naming and ordering of the proforma items.

An ICS, which conforms to the present document shall be a conforming ICS proforma completed in accordance with the guidance for completion given in clause A.1.

Instrumentation in accordance with ITU-T Recommendation O.172 [10] is appropriate for verifying conformance to these specifications.

Annex A (normative):
ICS proforma guidance

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the ICS proforma in this annex so that it can be used for its intended purposes and may further publish the completed ICS.

A.1   Guidance for completing the ICS proforma

A.1.1   Purposes and structure

The purpose of this ICS proforma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in EN 300 462-4-1 [4] may provide information about the implementation in a standardized manner.

The ICS proforma is subdivided into subclauses for the following categories of information:

-    guidance for completing the ICS proforma;

-    identification of the implementation;

-    identification of the EN;

-    global statement of conformance.

A.1.2   Abbreviations and conventions

The ICS proforma contained in annexes of the present document is comprised of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7 [9].

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Status column

The following notations, defined in ISO/IEC 9646-7 [9], are used for the status column:

m   mandatory - the capability is required to be supported.

o   optional - the capability may be supported or not.

n/a   not applicable - in the given context, it is impossible to use the capability.

x   prohibited (excluded) - there is a requirement not to use this capability in the given context.

o.i   qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.

ci   conditional - the requirement on the capability ("m", "o", "x" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table.

Reference column

The reference column makes reference to EN 300 462-4-1 [4], except where explicitly stated otherwise.

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [9], are used for the support column:

Y or y	supported by the implementation
N or n	not supported by the implementation
N/A, n/a or -	no answer required (allowed only if the status is n/a, directly or after evaluation of a conditional status)

If this ICS proforma is completed in order to describe a multiple-profile support in a system, it is necessary to be able to answer that a capability is supported for one profile and not supported for another. In that case, the supplier shall enter the unique reference to a conditional expression, preceded by "?" (e.g. ?3). This expression shall be given in the space for comments provided at the bottom of the table. It uses predicates defined in the SCS, each of which refers to a single profile and which takes the value TRUE if and only if that profile is to be used.

EXAMPLE: ?3: IF prof1 THEN Y ELSE N

It is also possible to provide a comment to an answer in the space provided at the bottom of the table.

Values allowed column

The values allowed column contains the type, the list, the range, or the length of values allowed. The following notations are used:

-	range of values:	<min value> .. <max value>
		example: 5 .. 20
-	list of values:	<value1>, <value2>, ..., <valueN>
		example: 2 ,4 ,6 ,8, 9
		example: '1101'B, '1011'B, '1111'B
		example: '0A'H, '34'H, '2F'H
-	list of named values:	<name1>(<val1>), <name2>(<val2>), ..., <nameN>(<valN>
		example: reject(1), accept(2)
-	length:	size (<min size> .. <max size>)
		example: size (1 .. 8)

Values supported column

The values supported column shall be filled in by the supplier of the implementation. In this column, the values or the ranges of values supported by the implementation shall be indicated.

References to items

For each possible item answer (answer in the support column) within the ICS proforma a unique reference exists, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns are discriminated by letters (a, b, etc.), respectively.

EXAMPLE 1:   A.5/4 is the reference to the answer of item 4 in table 5 of annex A.

EXAMPLE 2:   A.6/3b is the reference to the second answer (i.e. in the second support column) of item 3 in table 6 of annex A.

Prerequisite line

A prerequisite line takes the form: Prerequisite: <predicate>.

A prerequisite line after a clause or table title indicates that the whole clause or the whole table is not required to be completed if the predicate is FALSE.

A.1.3   Instructions for completing the ICS proforma

The supplier of the implementation shall complete the ICS proforma in each of the spaces provided. In particular, an explicit answer shall be entered, in each of the support column boxes provided, using the notation described in subclause A.1.2.

If necessary, the supplier may provide additional comments in space at the bottom of the tables, or separately on sheets of paper.

More detailed instructions are given at the beginning of the different subclauses of the ICS proforma.

Annex B (normative):
ICS proforma for EN 300 462-4-1, Timing characteristics of slave clocks for synchronization supply to SDH and PDH equipment

B.1   Identification of the implementation

In the present document, an Implementation Under Test (IUT) refers to an Synchronisation Supply Unit (SSU). An SSU can exist as a separate piece of equipment - Stand-Alone Synchronisation Supply Equipment (SASE) or it can form a logical function within another piece of equipment, for example a telephony exchange or SDH crossconnect. In the latter case, the piece of equipment within which the SSU function resides is the System Under Test (SUT).

Identification of the IUT and the SUT in which it resides should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

B.1.1   Date of the statement

....

B.1.2   Implementation Under Test (IUT) identification

IUT name:

....

....

IUT version:

....

B.1.3   System Under Test (SUT) identification (if appropriate)

SUT name:

....

....

Hardware configuration:

....

....

....

Operating system:

....

B.1.4   Product supplier

Name:

....

Address:

....

....

....

Telephone number:

....

Facsimile number:

....

E-mail address:

....

Additional information:

....

....

....

B.2   Identification of the EN

This ICS proforma applies to the following standard:

EN 300 462-4-1 [4] **:** "Transmission and Multiplexing (TM); Generic requirements for synchronization networks; Part 4-1: Timing characteristics of slave clocks suitable for synchronization supply to Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) equipment".

B.3   Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No)   ....

NOTE: Answering "No" to this question indicates non-conformance to the EN specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

B.4   SSU ICS proforma

B.4.1   SSU description

Table B.1: SSU description

Item	SSU function	Reference	Status	Support
1	The SSU supports one or more input external synchronization interfaces of one or more of the following types: 2 048 kHz, 2 048 kbit/s, or STM-N traffic	1,10	m	
2	The SSU supports one or more output external synchronization interfaces of one or more of the following types: 2 048 kHz, 2 048 kbit/s, or STM-N traffic	1,10	m	
3	The SSU is capable of maintaining operation (holdover) in the event all external timing references fail	1	m	

B.4.1.1   SSU interface description

Table B.2: SSU input interface description

Item	SSU input interface	Reference	Status	Support
1	The SSU supports an input external synchronization interface type of 2 048 kHz	1,10	o.201	
2	The SSU supports an input external synchronization interface type of 2 048 kbit/s	1,10	o.201	
3	The SSU supports an input external synchronization interface type of STM-N	1,10	o.201	
4	The SSU supports more than one input reference	1	o	

o.201: It is mandatory to support at least one of these items

Table B.3: SSU output interface description

Item	SSU output interface	Reference	Status	Support
1	The SSU supports an output external synchronization interface type of 2 048 kHz	1,10	o.301	
2	The SSU supports an output external synchronization interface type of 2 048 kbit/s	1,10	o.301	
3	The SSU supports an output external synchronization interface type of STM-N	1,10	o.301	

o.301: It is mandatory to support at least one of these items

B.4.2   SSU input tolerance

Table B.4: SSU input tolerance: pull-in, pull-out, loss-of-input

Item	SSU input tolerance	Reference	Status	Support
1	The minimum pull-in range shall be ± 0,01 ppm, whatever the internal oscillator frequency offset may be.	5	m	
2	The minimum pull-out range (under study)	5	n/a	
3	The SSU is capable of maintaining operation (holdover) in the event all external timing references fail	1	m	

Table B.5: SSU input jitter tolerance

Item	SSU input jitter tolerance	Reference	Status	Support
1	Jitter defined by the limits in EN 300 462-4-1 [4] Table 5 and Figure 3 shall be accommodated while maintaining the clock within prescribed performance limits set in EN 300 462-3-1 [3] subclause 7.2.2	7 7.1	m	
2	Jitter defined by the limits in EN 300 462-4-1 [4] Table 5 and Figure 3 shall be accommodated without causing any alarms	7 7.1	m	
3	Jitter defined by the limits in EN 300 462-4-1 [4] Table 5 and Figure 3 shall be accommodated without causing the clock to switch references	7 7.1	c501	
4	Jitter defined by the limits in EN 300 462-4-1 [4] Table 5 and Figure 3 shall be accommodated without causing the clock to go into holdover	7 7.1	m	

c501:   IF B.2/4 THEN m ELSE n/a -- B.2/4: more than one input supported

Table B.6: SSU input wander tolerance

Item	SSU input wander tolerance	Reference	Status	Support
1	Wander defined by the limits in EN 300 462-4-1 [4] Table 6 and Figure 4 shall be accommodated while maintaining the clock within prescribed performance limits set in EN 300 462-3-1 [3] subclause 7.2.2	7 7.2	m	
2	Wander defined by the limits in EN 300 462-4-1 [4] Table 6 and Figure 4 shall be accommodated without causing any alarms	7 7.2	m	
3	Wander defined by the limits in EN 300 462-4-1 [4] Table 6 and Figure 4 shall be accommodated without causing the clock to switch references	7 7.2	c601	
4	Wander defined by the limits in EN 300 462-4-1 [4] Table 6 and Figure 4 shall be accommodated without causing the clock to go into holdover	7 7.2	m	
5	Wander defined by the limits in EN 300 462-4-1 [4] Table 7 and Figure 5, which can be tested using test signals described in Table 8 and Figure 6, shall be accommodated while maintaining the clock within prescribed performance limits set in EN 300 462-3-1 [3] subclause 7.2.2	7 7.2	m	
6	Wander defined by the limits in EN 300 462-4-1 [4] Table 7 and Figure 5, which can be tested using test signals described in Table 8 and Figure 6, shall be accommodated without causing any alarms	7 7.2	m	
7	Wander defined by the limits in EN 300 462-4-1 [4] Table 7 and Figure 5, which can be tested using test signals described in Table 8 and Figure 6, shall be accommodated without causing the clock to switch references	7 7.2	c601	
8	Wander defined by the limits in EN 300 462-4-1 [4] Table 7 and Figure 5, which can be tested using test signals described in Table 8 and Figure 6, shall be accommodated without causing the clock to go into holdover	7 7.2	m	

c601:   IF B.2/4 THEN m ELSE n/a -- B.2/4: more than one input supported

B.4.3   SSU output noise generation in locked mode

Table B.7: SSU output noise generation in locked mode of operation

Item	SSU locked-mode output noise generation	Reference	Status	Support
1	The intrinsic jitter at SSU outputs of 2 048 kHz and 2 048 kbit/s measured over 60 seconds shall not exceed 0,05 UIpp when measured through a band-pass filter with corner frequencies at 20 Hz and 100 kHz each with a 20 dB/decade roll-off characteristic	6 6.3.1	c701	
2	The intrinsic jitter at SSU outputs at STM-N interfaces measured over 60 seconds shall not exceed the limits given in EN 300 462-4-1 [4] Table 4	6 6.3.1	c702	
3	The wander generated at SSU outputs with the temperature constant to $\pm$ 1 K shall not exceed the TDEV limits defined in EN 300 462-4-1 [4] Table 1 and Figure 1	6 6.1	m	
4	The wander generated at SSU outputs with the temperature constant to $\pm$ 1 K shall not exceed the MTIE limits defined in EN 300 462-4-1 [4] Table 2 and Figure 2	6 6.1	m	
5	The wander generated at SSU outputs with temperature effects included shall not exceed the MTIE limits defined in EN 300 462-4-1 [4] Table 2, Figure 2, and Table 3 with a 1 µs limit for observation periods greater then 10 000 seconds	6 6.1	m	

c701:   IF B.3/1 OR B.3/2 THEN m ELSE n/a -- B.3/1 OR B.3/2: 2 048 kHz OR 2 048 kbit/s outputs supported
c702:   IF B.3/3 THEN m ELSE n/a -- B.3/3: STM-N output supported

B.4.4   SSU transfer characteristic

Table B.8: SSU transfer characteristic

Item	SSU transfer characteristic	Reference	Status	Support
1	The SSU bandwidth is limited to a maximum of 3 MHz	8	m	
2	Wander defined by the limits in EN 300 462-4-1 [4] Table 7 and Figure 5 shall produce an output signal that lies within the limits specified in EN 300 462-4-1 [4] Table 9 and Figure 7	7 7.2 8	m	
3	The phase gain of the SSU in the passband is less than 0.2 dB	8	m	

B.4.5 SSU transient response and holdover performance

Table B.9: SSU transient response and holdover performance

Item	SSU transient response and holdover performance	Reference	Status	Support
1	In the event of input reference switching, the SSU output phase variation, relative to the input reference before it was lost, shall be bounded by the requirements specified in EN 300 462-4-1 [4] Figure 8	9	c901	
2	During holdover, the phase error at the SSU output relative to the input at the moment of loss of reference shall not exceed the limit defined in EN 300 462-4-1 [4] subclause 9.2	9 9.2 6.2	m	
3	The SSU response to input signal interruptions is to be defined	9 9.3	n/a	
4	For internal disturbances such as major hardware failures, the phase variation on 2 048 kHz and 2 048 kbit/s outputs over any period S up to 1 ms shall not exceed 60 ns	9 9.4	c902	
5	For internal disturbances such as major hardware failures, the phase variation on 2 048 kHz and 2 048 kbit/s outputs over any period S up to 4 s shall not exceed 120 ns	9 9.4	c902	
6	For internal disturbances such as major hardware failures, the phase variation on 2 048 kHz and 2 048 kbit/s outputs over any period S greater than 4 s shall not exceed 240 ns	9 9.4	c902	
7	For internal disturbances such as major hardware failures, the temporary frequency offset on STM-N outputs shall not exceed 7,5 ppm	9 9.4	c903	

c901:   IF B.2/4 THEN m ELSE n/a -- B.2/4: more than one input supported

c902:   IF B.3/1 OR B.3/2 THEN m ELSE n/a -- B.3/1 OR B.3/2: 2 048 kHz OR 2 048 kbit/s outputs supported

c903:   IF B.3/3 THEN m ELSE n/a -- B.3/3: STM-N output supported

History

Document history				
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V1.1.1	October 1999	Vote	V 9951:	1999-10-05 to 1999-12-03