

<b>Standard</b>	<b>Publication Date</b>	<b>Description</b>
G.703	2001-11	"Physical/electrical characteristics of hierarchical digital interfaces".  Defines the "G.703-13" 2048 kHz analogue synchronisation signal or "G.703-9" 2048 kbit/s digital synchronisation signals presented as either 120 ohms balanced or 75 ohms unbalanced.
G.704	1998-10	Equivalent to EN 300 166 Defines the frame structure/functional characteristics of interfaces associated with network nodes, synchronous digital multiplex equipment, PCM multiplexing equipment (i.e. 1544, 2048, 8448 kbit/s, etc.).
G.709	2001-02	Network node interfaces for the Optical Transport Network (OTN)
G.783	2000-10	Characteristics of Synchronous Digital Hierarchy (SDH) Equipment Functional Blocks
G.803	2000-03	"Architecture of transport networks based on the synchronous digital hierarchy (SDH)". This defines the 20xSEC and 10xSSU rule in SDH networks. Equivalent to EN 300 462-2-1
G.810	1996-08	"Definitions and terminology for synchronisation networks"  Equivalent to ETSI EN 300 462-1-1.
G.811	1997-09	"Timing requirements of primary reference clocks" Defines requirements of Level 1 Primary Reference Clock systems.
G.812	1998-06	Equivalent to ETSI EN 300 462-6-1. "Timing requirements of slave clocks suitable for use as node clocks in synchronisation networks" Defines requirements of slave clocks (Level 2 & 3).
G.813	2003-03	Equivalent to ETSI EN 300 462-4-1 and EN 300 462-7-1. "Timing characteristics of SDH equipment slave clocks (SEC)."
G.822	1988-11	Equivalent to ETSI EN 300 462-5-1. "Controlled Slip Rate Objectives on an International Digital Connection"
G.823	2000-03	Defines the "1 slip in 72 days" requirement "The control of jitter and wander within digital networks which are based on the 2.048 kbit/s hierarchy". Defines control of jitter and wander in digital networks based on the 2048 kbit/s hierarchy.
G.824	2000-03	Equivalent to EN 302 084 "The control of jitter and wander within digital networks which are based on the 1,544 kbit/s hierarchy".
G.825	2000-03	Defines control of jitter and wander in digital networks based on the 1544 kbit/s hierarchy. "The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)".
G.8251	2001-11	Defines control of jitter and wander in digital networks based on the synchronous digital hierarchy (SDH). The Control of Jitter and Wander Within the Optical Transport Network (OTN)

This will be the next important standard as far as synchronisation is concerned to emerge from ITU-T Study Group 15 WP3 Network Synchronisation and Time Distribution Performance.

G.8261	2006-05	Timing and synchronization aspects in packet networks. Proposes Jitter and Wander limits as portions of the G.823 Limits to be assigned to Circuit Emulation Islands. Most revolutionary proposal is for Synchronous Ethernet, Making the physical line clock of Ethernet lockable to an External reference. Also proposes standard test scenario CES equipment.
G.8262	2009-10	Timing characteristics of synchronous ethernet equipment slave clock (EEC) Contains clock specifications for Ethernet Equipment Clocks analagous to the SDH specifications in G.811/812/813 G.8264 2008-10 Distribution of timing information through packet networks Contains functional models of packet network clocks and the logical flows of timing information through the network.
O.171	1997-04	"Timing jitter and wander measuring equipment for digital systems which are based on the plesiochronous digital hierarchy (PDH)."
O.172	1999-03	"Jitter and wander measuring equipment for digital systems which are based on the synchronous digital hierarchy (SDH)".
O.173	2003-02	"Jitter measuring equipment for digital systems which are based on the Optical Transport Network (OTN)."
0.174	2009-11	"Jitter and wander measuring equipment for a synchronous packet network (SyncE)."

## ETSI Standards & Other Publications

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<b>Standard</b>	<b>Publication Date</b>	<b>Description</b>
TR 101 685 v1.1.1	1999-08	"Transmission and Multiplexing (TM); Timing and Synchronisation aspects of Asynchronous Transfer Mode (ATM) networks"
TS 145 010 v4.0.0.0	2001-04	"GSM: Digital cellular telecommunication system (Phase 2+); Radio subsystem synchronisation (GSM 05.10)".  This is the standard which defines the RF stability of GSM basestations as $5 \times 10^{-8}$ .
TS 125 105 v4.1.0	2001-06	Universal Mobile Telecommunications System (UMTS); UTRA (BS) TDD; Radio transmission and Reception (3GPP TS 25.105 version 4.1.0 Release 4)
TS 125 402 v4.1.0	2001-06	Universal Mobile Telecommunications System (UMTS); Synchronisation in UTRAN Stage 2 (3GPP TS 25.402 version 4.1.0 Release 4)
EG 201 793 v1.1.1 .	2000-10	"Transmission and Multiplexing (TM); Synchronisation Network Engineering"  This is an ETSI Guide rather than a Standard, but is one of the better documents and captures a lot of the key issues
ETS 300 147	1996	"Transmission and Multiplexing (TM); Synchronous Digital Hierarchy(SDH) Multiplexing Structure".
ETS 300 166	1993-08	"Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2,048 kbit/s-based plesiochronous or synchronous digital hierarchies".

		Equivalent to G.703.
EN 300 417-6-1 v1.1.3	1999-05	"Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 6-1: Synchronisation layer functions"
		This is one of a family of documents that has been produced in order to provide inter-vendor and inter-operator compatibility of Synchronous Digital Hierarchy (SDH) equipment.
EN 300 462-x Series		"Transmission and Multiplexing (TM); Generic requirements for synchronisation networks"
		The main family of synchronisation definitions for SEC's, SSU's and PRC's. Equivalent to G.811, G.812, G.813. See below for the complete series
EN 300 462-1-1 v1.1.1	1998-05	"Part 1-1: Definitions and terminology for synchronisation networks" Equivalent to G.810
EN 300 462-2-1 v1.1.2	1999-08	"Part 2-1: synchronisation network architecture"
		This defines the 20xSEC and 10xSSU rule in SDH networks. Equivalent to G.803.
EN 300 462-3-1 v1.1.1	1998-05	"Part 3-1: The control of jitter and wander within synchronisation networks".
EN 300 462-4-1 v1.1.1	1998-05	"Part 4-1: Timing characteristics of slave clocks suitable for synchronisation supply to Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) equipment".
		The main ETSI Standard for specifying SSU/SASE's in terms of holdover and jitter/wander. Equivalent to G.812.
EN 300 462-5-1 v1.1.2	1998-05	"Part 5-1: Timing characteristics of slave clocks suitable for operation in Synchronous Digital Hierarchy (SDH) equipment"
		The main ETSI Standard for specifying SEC's in terms of holdover and jitter/wander. Equivalent to G.813.
EN 300 462-6-1 v1.1.1	1998-05	"Part 6-1: Timing characteristics of primary reference clocks"
		The main ETSI Standard for specifying PRC's in terms of holdover and jitter/wander. Equivalent to G.811.
EN 300 462-7-1 v1.1.2	2001-06	"Part 7-1: Timing characteristics of slave clocks suitable for synchronisation supply to equipment in local node applications".
		The main ETSI Standard for specifying Local SSU/SASE's in terms of holdover and jitter/wander. Equivalent to G.812.
TS 100 912 v8.8.0	2001-04	"GSM: Digital cellular telecommunication system (Phase 2+); Radio subsystem synchronisation (GSM 05.10)".
		This is the standard which defines the RF stability of GSM base stations as $5 \times 10^{-8}$
		<a href="#">Same as TS 145 010 (above)</a>
EN 302 084 v1.1.1	2000-02	"Transmission and Multiplexing (TM); The control of jitter and wander in transport networks"
		Equivalent to G.823 & G.825

## **IEEE**

IEC 61588

2004-09

IEEE1588 : Precision clock synchronization protocol for networked measurement and control systems

## **MEF**

MEF 8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks

MEF 18 Abstract Test Suite for Circuit Emulation Services

MEF 22 Mobile Backhaul Implementation Agreement (2/09)