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International Telecommunication Union
Standardization Sector

Recommendation

ITU-T G.8312.20 (2024) Amd. 1 (08/2024)

SERIES G: Transmission systems and media, digital systems and networks

Packet over Transport aspects – Mobile network transport aspects

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Overview of fine grain MTN
Amendment 1

ITU-T G-SERIES RECOMMENDATIONS

Transmission systems and media, digital systems and networks

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100-G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200-G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300-G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400-G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450-G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600-G.699
DIGITAL TERMINAL EQUIPMENTS	G.700-G.799
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MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000-G.1999
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Service Management	G.8600-G.8699
ACCESS NETWORKS	G.9000-G.9999

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

Recommendation ITU-T G.8312.20
Overview of fine grain MTN

Amendment 1

Summary

Recommendation ITU-T G.8312.20 provides an overview of the functions provided by the fine grain MTN (fgMTN) layer network and identifies the Recommendations where the functions are defined.

Amendment 1 updates the overview of the fgMTN Recommendations series to include the fgMTN protection and equipment Recommendations.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T G.8312.20	2024-03-22	15	11.1002/1000/15797
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FOREWORD

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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.

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Recommendation ITU-T G.8312.20

Overview of fine grain MTN

Amendment 1

Editorial note: This is a complete-text publication. Modifications introduced by this amendment are shown in revision marks relative to Recommendation ITU-T G.8312.20 (2024).

1 Scope

This Recommendation provides an overview of the functions provided by the fine grain MTN (fgMTN) layer network and identifies the Recommendations where the functions are defined.

2 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.

[ITU-T G.808.4] Recommendation ITU-T G.808.4 (2024), *Linear protection for fine grain metro transport network (fgMTN) and fine grain optical transport network (fgOTN).*

[ITU-T G.8310] Recommendation ITU-T G.8310 (2020), *Architecture of the metro transport network.*

[ITU-T G.8312] Recommendation ITU-T G.8312 (2020), *Interfaces for metro transport networks*.

[ITU-T G.8321] Recommendation ITU-T G.8321 (2022), *Characteristics of metro transport network equipment functional blocks*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CBR Constant Bit Rate

CPE Customer Premises Equipment

fgMU fine grain Multiplex Unit

fgMTN	fine grain MTN
fgMTNP	fine grain MTN Path
LAN	Local Area Network
MTN	Metro Transport Network
MTNP	MTN Path
MTNS	MTN Section
PHY	Physical layer entity
TDM	Time Division Multiplexing

5 Conventions

None.

6 Application scenarios

With the continuous development of new generations of wireless networks, mobile transport network provides service for vertical industries such as smart grid, smart harbor, smart railway and smart health care. These connections are packet client either at the full physical layer entity (PHY) rate (e.g., 10 Mbit/s Ethernet or 100 Mbit/s Ethernet) or at a sub-rate (where the bit rate supported across the network is less than the bit rate of the client interface). To guarantee the network performance, those connections that carry production and control type of services are required to be hard isolated from other traffic in the network. In addition, mobile transport network is a multi-service bearing network and will be shared between wireless backhaul services and dedicated line service. These dedicated line services have higher requirements on isolation, security and reliability but with smaller bandwidth. For the network operators, it is necessary to define a new fine granularity layer network to support these services across the existing metro transport network (MTN).

A hypothetical reference network showing multiple sub1G clients using fgMTN connections is illustrated in Figure 6-1. At the remote site all traffic is consolidated onto a single Ethernet interface to the fgMTN transport network. At the headquarters location, services from all remote sites are consolidated onto one or more Ethernet interfaces. The server may be a cloud-based server or a local area network (LAN) in the client's headquarters.

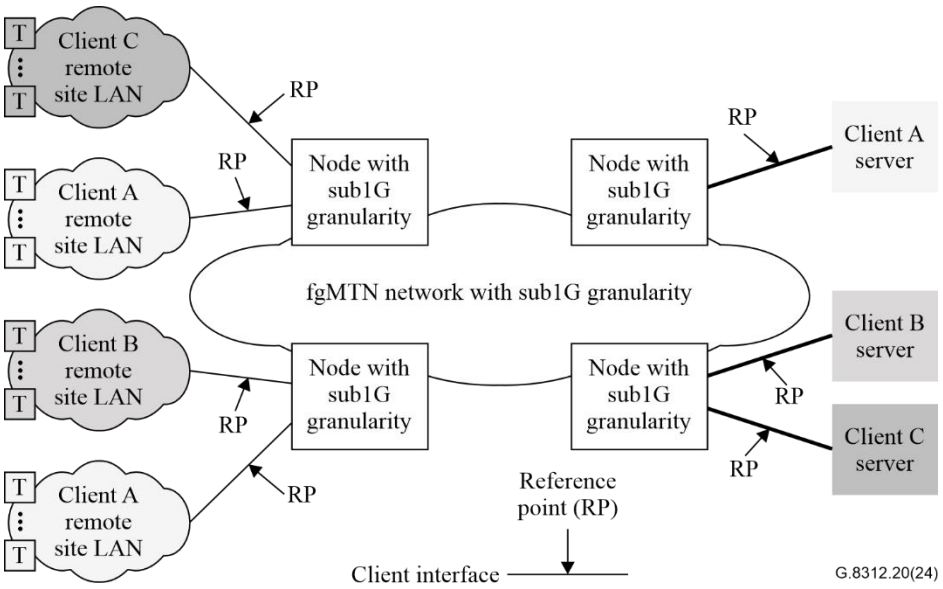

Figure 6-1 – HRM for sub1G clients over fgMTN

Figure 6-2 shows an example of packet clients over fgMTN connections for client A between the remote sites and the headquarters, and between the remote sites. The option of using customer premises equipment (CPE) to terminate the fgMTN connections is also illustrated. The packet client connections share the same interface at both the remote sites and at the headquarters site. In some cases, separate interfaces may be used.

All connections provided by the fgMTN transport network are bidirectional point to point.

Table 6-1 gives the fgMTN connection characteristics.

Table 6-1 – fgMTN connection characteristics

Server bandwidth granularity	k × 10.3844 Mbit/s
Server capacity	5 Gbit/s MTN path
Maximum client size	480 × 10.3125 Mbit/s

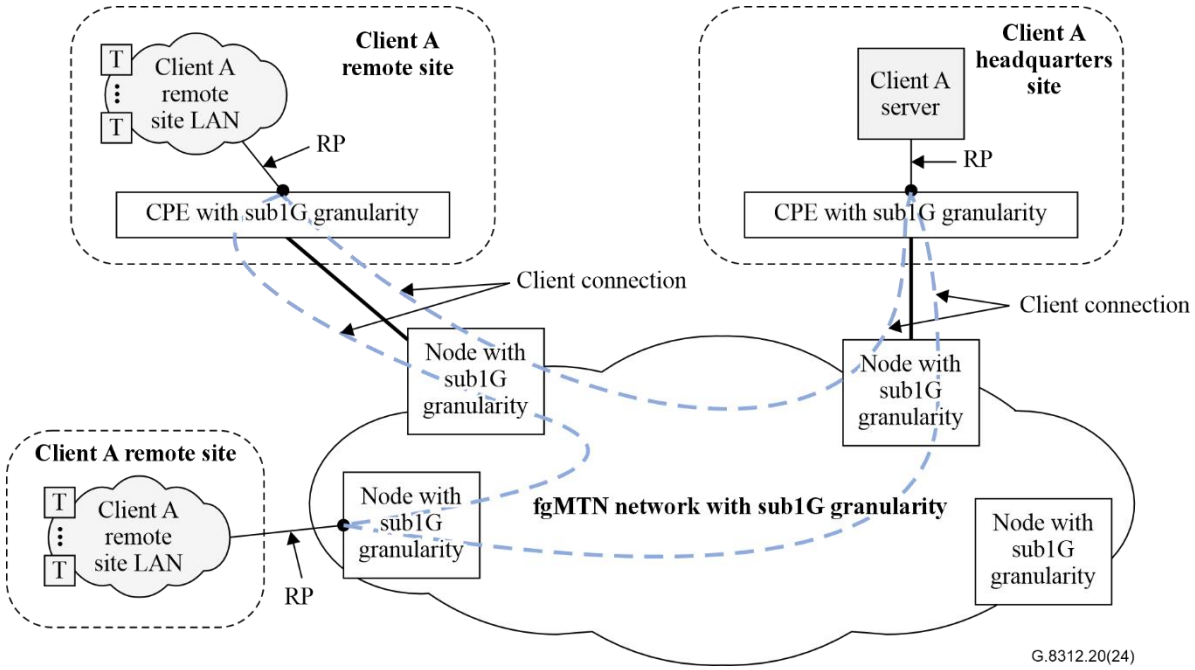

Figure 6-2 – Example of packet clients over fgMTN connections

7 Functional requirements

Time division multiplexing (TDM) transport network technology has been well known and recognized in vertical industry for being secure and reliable. Consequently, fgMTN should support TDM hard isolation.

fgMTN should support deterministic latency to guarantee the highest priority traffic network performance.

fgMTN should support 10 Mbit/s level tributary slots granularity. Considering that the bandwidth of major key production services is less than 20 Mbit/s, that the one of financial leased line services is 2 Mbit/s to 100 Mbit/s, and that the one of e-Government leased lines is from 10 Mbit/s to 2 Gbit/s, 10 Mbit/s granularity is a balance among customer signal rate, bandwidth efficiency and device implementation complexity.

fgMTN should support packet clients. It is expected that the major services will be packet with Ethernet interfaces. fgMTN should be optimized to support packet services. Hitless bandwidth adjustment capability should be supported for packet services.

fgMTN should allow future extension to constant bit rate (CBR) service.

fgMTN should support 1+1 bidirectional trail protection.

8 Overview of fgMTN Recommendation series

8.1 fgMTN architecture

When the fine grain metro transport network (MTN) path (fgMTNP) layer is present, the MTN consists of three digital layer networks: the fine grain MTN path (fgMTNP) layer, the MTN path (MTNP) layer and the MTN section (MTNS) layer. The fgMTN path signals are mapped/multiplexed into the MTNP layer as illustrated in Figure 8-1.

The functional architecture of fgMTN layer and the relationship between the MTN and fgMTN layer networks are defined in [ITU-T G.8310].

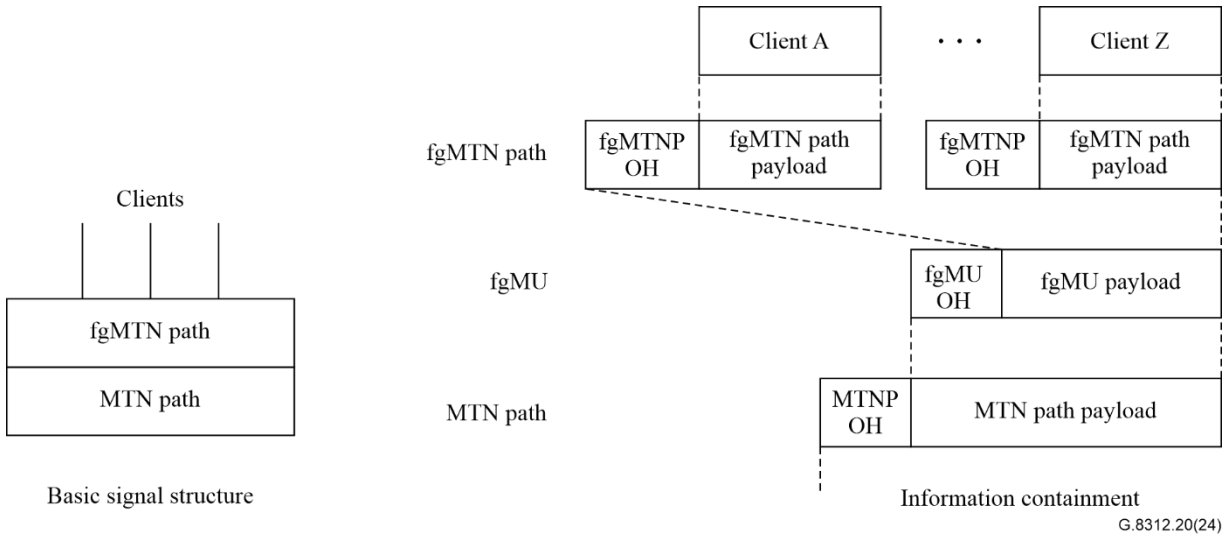

Figure 8-1 – Structure and information containment relationships for fgMTN

8.2 fgMTN interface

The fgMTNP signals are multiplexed into the fine grain multiplex unit (fgMU) packet structures, and the fgMUs are carried within the MTNP.

The fgMU structure, functionality of the overhead, fgMTNP OAM and the client mappings are defined in Annex A of [ITU-T G.8312].

8.3 fgMTN protection

The fgMTNP supports linear protection mechanism to protect fgMTNP channels end-to-end.

The fgMTNP linear protection mechanism is defined in [ITU-T G.808.4].

8.4 fgMTN equipment

The functionalities of fgMTN equipment are defined in [ITU-T G.8321].

Appendix I

The fgMTN hypothetical reference network

(This appendix does not form an integral part of this Recommendation.)

A hypothetical reference network showing multiple clients using fgMTN connections is illustrated in Figure 6-1. Further information on the network topology is provided in this appendix.

Table I.1 gives the fgMTN network topology considerations.

Table I.1 – fgMTN network topology

Traffic pattern	Between a remote site and the headquarters site	Y
	Between remote sites	Y
Redundancy	Protection/restoration in transport network	Y
	Client interfaces	Y
	Physically diverse feeds to client locations	Y
	Dual feed to redundant servers	Y
Network size	Max connection length	1 000 km
	Number of fgMTN hops	Typically, 10 Max ~20
	Number of connections supported by a core node	≥ 3 700
	Core switching node capacity	160 G-320 G
Number of remotes connected to the headquarters		100 ~ 3 000

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