

GENERAL SPECIFICATION

TELECOMMUNICATIONS

GS EP TEL 120

Point to point microwave links

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General Specification		GS EP TEL 120
Point to point microwave links		
Rev.: 07	Effective date: 05/2015	Page: 2 of 17

Contents

1. Scope	3
2. Reference documents	3
3. Design conditions	5
3.1 Geographical constraints	5
3.2 Environmental conditions	5
3.3 Site motions	5
3.4 Hazardous areas	6
3.5 Local regulations	6
4. Technical requirements	6
4.1 Frequency band	6
4.2 Radio equipment characteristics	6
4.3 Antenna characteristics	8
4.4 RF connections	9
4.5 Interfaces connections and throughput	10
4.6 Availability and performance	10
4.7 Electrical characteristics	10
5. Technical documents	11
5.1 Traffic capacity	11
5.2 Basic Engineering	11
5.3 Detail Engineering	13
5.4 Factory acceptance tests	13
5.5 As-built Documentation	15
Bibliography	16
Appendix 1 Glossary	17

Point to point microwave links

Rev.: 07

Effective date: 05/2015

Page: 3 of 17

1. Scope

The purpose of this General Specification is to define the minimum requirements for design, manufacture, installation and testing of point to point microwave digital radio links.

This specification applies to any and all industrial sites (offshore and onshore), campus, offices, accommodation camps, etc.

The point to point microwave digital radio links shall be used as a transmission facilities integrated within Company private telecommunications network, and as interconnection means to domestic and international circuits.

This specification applies particularly to the following:

- Transmission over digital channels, with various rates from $n \times 2 \text{ Mb/s}$ to $n \times \text{STM-1}$ and STM-4, or more as available,
- Auxiliary systems associated with the operation of the concerned links.

This specification provides also additional details to complete **GS EP TEL 700** regarding the definition of work and services to be provided.

This Specification does not cover Free Space Optics connectivity, nor Broadband Optical Wireless equipment.

The verbal forms used to indicate levels of requirement are specified in [ISO/IEC Directives, Part 2](#) and in the [Characteristics of good requirements, INCOSE symposium 1996](#).

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
Directive 1999/5/EC	Directive on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity
ATEX Directive 94/9/EC	Directive on equipment and protective systems intended for use in potentially explosive atmospheres
Characteristics of good requirements, INCOSE symposium 1996	Requirements Working Group of the International Council on Systems Engineering (INCOSE symposium 1996)
ETSI EN 301 489	Electromagnetic compatibility and radio spectrum matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services

Point to point microwave links

Rev.: 07

Effective date: 05/2015

Page: 4 of 17

Reference	Title
ETSI EN 301 126-1	Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures
ETSI EN 301 126-3-1	Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures
ETSI EN 302 217	Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas
ETSI TR 101 506	Fixed Radio Systems; Generic definitions, terminology and applicability of essential requirements under the article 3.2 of 1999/05/EC Directive to Fixed Radio Systems
IEC 60487	Methods of measurement for equipment used in terrestrial radio-relay systems
IEC 60835	Methods of measurement for equipment used in digital microwave radio transmission systems
IEC 60950	Information technology equipment - Safety
ISO / IEC Directives, Part 2	Rules for the structure and drafting of International Standards
ITU-R BT.656-5	Interface for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601
ITU-R F.557-4	Availability objective for radio-relay systems over a hypothetical reference circuit and a hypothetical reference digital path
ITU-R F.634-4	Error performance objectives for real digital radio-relay links forming part of a high-grade circuit within an integrated service digital network
ITU-R F.695	Availability objectives for real digital radio-relay links forming part of a high-grade circuit within an integrated services digital network
ITU-R F.752-2	Diversity techniques for point-to-point fixed wireless systems
ITU-R M.1225	Guidelines for evaluation of radio transmission technologies for IMT-2000
ITU-R P.1410-5	Propagation data and prediction methods required for the design of terrestrial broadband radio access systems
ITU-R P.530-14	Propagation data and prediction methods required for the design of terrestrial line-of-sight systems
ITU-T G.826	End-to-end error performance parameters and objectives for international constant bit rate digital paths and connections
ITU-T X.690	Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)

General Specification		GS EP TEL 120
Point to point microwave links		
Rev.: 07	Effective date: 05/2015	Page: 5 of 17

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP SAF 216	Area classification
GS EP TEL 410	Installation rules
GS EP TEL 414	Telecommunication Cables
GS EP TEL 700	Telecommunications Engineering services

3. Design conditions

3.1 Geographical constraints

All geographical constraints on or around the sites shall be taken into account: sea water, mountains, deserts and obstacles (forests, buildings...), etc.

3.2 Environmental conditions

All indoor and outdoor equipment shall be suitable for continuous and reliable operation in the service conditions stated in the environmental data specification of the project (i.e. general design specification / equipment design conditions).

All climatic constraints shall be taken into account: marine environment (salt spray), extreme wind conditions, lightning and storm, extreme temperatures (high or low), high or low humidity, frost, dust, solar radiation, etc...

All indoor equipment shall also be capable of operating for a short time at a temperature higher than nominal to cover for a shutdown of air conditioning.

All outdoor equipment shall be robustly constructed, highly reliable and suitably protected against the corrosive effects of a humid, salt, dust, and H₂S laden atmosphere. Outdoor equipment shall not be affected by tropical rain or by the operation of deluge systems.

Only equipment that are particularly suitable for this environment shall be selected and specified, whilst requiring minimal maintenance.

3.3 Site motions

In case of installation on a floating platform or any other type of vessel, the motions expected in operating conditions (roll, pitch, yaw, surge, sway, heave...) shall be taken into account to select the necessary type of equipment, to establish the link budget, and to verify the performance objectives (availability and error performance figures, etc...) are met.

If deemed necessary to meet the performance objectives, auto-tracking stabilized antennas installed inside protective radomes shall be provided.

General Specification		GS EP TEL 120
Point to point microwave links		
Rev.: 07	Effective date: 05/2015	Page: 6 of 17

3.4 Hazardous areas

All equipment (dishes, antennas, outdoor units, cables or waveguides...) installed in hazardous areas shall be suitable for use in the related zones, in full compliancy with the [GS EP SAF 216](#).

All related equipment shall have an ATEX certification as per [ATEX Directive 94/9/EC](#) according to the particular hazardous area classification of the Project, or shall be shutdown in case of gas detection in the area.

3.5 Local regulations

All necessary documents to be approved by the national Regulatory Authority of the country shall be prepared and provided, including necessary technical parameters, calculations and studies.

Depending on the specified frequency plan and on the country, the need to obtain radio frequency licences shall be indicated.

4. Technical requirements

The specifications listed herein shall be considered as minimum requirements. Part of these characteristics shall be further developed during engineering studies.

All the equipment shall be in compliance with [R&TTE Directive 1999/5/EC](#) and [ETSI TR 101 506](#).

4.1 Frequency band

The frequency band to be used shall be defined on the basis of the frequency plan issued by the [ETSI EN 302 217](#), [ETSI EN 301 489](#) and ITU RR for point to point radio service in the considered country. A prior approval of the national Regulatory Authority shall be obtained before considering the proposed frequencies as final.

4.2 Radio equipment characteristics

The type of radio equipment shall be defined on the basis of the following criteria:

- Existing Company point to point radio system,
- Conditions of propagation along the link path,
- Type of modulation,
- Carrier spacing,
- Possible interference with other systems, pertaining or not to Company,
- Diversity method and polarization of the radio signal.

4.2.1 Link Budget

Each link budget hop shall be calculated using the method included into the [ITU-R P.530-14](#), including the rain factor. The reference BER rate shall be 10E-6.

Each profile hop shall be described with Pathloss or similar professional tool.