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SERIES L: ENVIRONMENT AND ICTS, CLIMATE
CHANGE, E-WASTE, ENERGY EFFICIENCY;
CONSTRUCTION, INSTALLATION AND PROTECTION
OF CABLES AND OTHER ELEMENTS OF OUTSIDE
PLANT

Smart energy solution for telecommunication rooms

Recommendation ITU-T L.1382

ITU-T L-SERIES RECOMMENDATIONS

**ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION,
INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT**

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Recommendation ITU-T L.1382

Smart energy solution for telecommunication rooms

Summary

Recommendation ITU-T L.1382 specifies requirements for the power supply mode of the three-layer architecture of telecommunication rooms. Recommendation ITU-T L.1382 aims to drive future-oriented network deployment for the information and communication technology (ICT) industry, as well as maximizing energy efficiency, the use of renewable resources and social resources in the digital era, and reduce energy and resource consumption. while ensuring network performance and user experience. Innovative ICTs are used to promote network energy saving, emission reduction and circular economy development, as well as continuously driving all parties in the industry chain to jointly build green networks and low-carbon societies. In addition, Recommendation ITU-T L.1382 provides suggestions and requirements on the deployment of three types of telecommunication rooms, which can be used as a reference for operators to build the target network evolution strategies for telecommunication room power supply. Recommendation ITU-T L.1382 accelerates network deployment, reduces capital expenditure (CAPEX) and operating expenditure (OPEX), optimizes investment efficiency, and guides ICT industry transformation and optimization. The new networking architecture, new power supply technologies and specifications in Recommendation ITU-T L.1382 will also effectively promote the upgrade of industry technologies.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Lithium battery, power feeding, smart energy, telecommunication room.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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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Introduction

With the increasing popularity of fifth generation (5G), a series of significant changes has taken place in telecommunication networks, including the addition of wireless frequency, fixed access, fibre-in and copper-out, all-optical fibre to the x (FTTx), with "x" being the home, the antenna, etc., telecommunication room capacity expansion and fixed-mobile convergence/information and communication technology (FMC/ICT) convergence. Site functions will also change from single telecommunication connections to comprehensive functions. Digitalization drives ICT infrastructure to become wider, faster and smarter.

In the 5G era, both wireless and fixed networks are facing upgrades. The wireless bandwidth will be increased from 1 Gbit/s or 2.5 Gbit/s to 10 Gbit/s or 25 G bit/s. The high 5G frequency band will cause the site density to be several times that of conventional 2G, 3G or 4G networks. A large number of new sites brings site acquisition difficulty, some operators will deploy base band units (BBUs) in the access and aggregation telecommunication room, increasing its power consumption.

The impact of the fixed network on the evolution of telecommunication rooms is more obvious. The home broadband bandwidth will be increased from 10 Mbit/s to 100 Mbit/s, the enterprise private line will be upgraded from a gigabit passive optical network (GPON) to a 10GPON, and the big video will be increased from 1 kbit/s or 2 kbit/s to 4 kbit/s or 8 kbit/s. The fixed network will enter the F5G era.

However, the running of the ICT infrastructure and its connected terminals also consumes huge amounts of energy and resources.

Recommendation ITU-T L.1382

Smart energy solution for telecommunication rooms

1 Scope

This Recommendation specifies a smart energy solution for telecommunication rooms. It provides design requirement for the power supply and backup systems for telecommunication rooms of the integrated access, aggregation and core types, based on the trend of fifth generation (5G), edge computing sinking and content delivery network (CDN) sinking.

2 Reference

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 L.1350] | Recommendation ITU-T L.1350 (2016), <i>Energy efficiency metrics of a base station site</i> . |
| [IEC 60950-1] | IEC 60950-1:2013, <i>Information technology equipment – Safety – Part 1: General requirements</i> . |
| [IEC 62368-1] | IEC 62368-1:2018, <i>Audio/video, information and communication technology equipment – Part 1: Safety requirements</i> . |
| [IEC 62619] | IEC 62619:2017, <i>Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications</i> . |

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 content delivery network sinking: A content delivery network (CDN) not centralized, but moved near to the end user.

3.2.2 fixed 5G network: An end-to-end (E2E) full-fibre network comprised of on-premise network, access network, transport network and Internet protocol (IP) network.

3.2.3 metropolitan area network (MAN): A medium-scale computer network with area larger than that covered by a local area network (LAN) and smaller than that covered by a wide area network (WAN). It interconnects multiple LAN networks in a geographic region of a city.

3.2.4 site energy efficiency (SEE): The ratio between the total energy consumption of telecommunication equipment and the total energy consumption of a site.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

2G	second Generation
3G	third Generation
4G	fourth Generation
5G	fifth Generation
AAU	Active Antenna Unit
AI	Artificial Intelligence
BBU	Base Band Unit
BMS	Battery Management System
CAPEX	Capital Expenditure
CDN	Content Delivery Network
CT	Communication Telecommunication
C-RAN	Cloud-Radio Access Network
E2E	End-to-End
F5G	Fixed 5G
FMC	Fixed-Mobile Convergence
FTTx	Fibre To The x
GPON	Gigabit Passive Optical Network
HVDC	High-Voltage Direct Current
ICT	Information and Communication Technology
IP	Internet Protocol
IT	Information Technology
LAN	Local Area Network
LFP	Lithium iron Phosphate
MAN	Metropolitan Access Network
O&M	Operation and Maintenance
OPEX	Operating Expenditure
PSU	Power Supply Unit
RF	Radio Frequency
SEE	Site Energy Efficiency
SOC	State Of Charge
SOH	State Of Health
WDM	Wavelength Division Multiplexer
WAN	Wide Area Network

5 Conventions

None.

6 Telecommunication room evolution

Fixed sites, especially the sites serving the new generation mobile service network, the so called fixed 5G network (F5G), are entering the all-optical era, which is driven by experience. In the all-optical era, all-round transformation is required. First, gigabit is no longer a new term. Gigabit broadband services have entered into commercial use in more than 50 countries and will become the mainstream bandwidth in the next decade. Second, fibre connections and 5G will be used in a variety of industries.

The all-round optical network transformation will trigger new technical trends in the telecommunication room, such as bearer network bandwidth upgrade and ICT convergence (core network cloudification, edge computing sinking, and CDN deployment or downstream sinking). This clause describes the requirements for the existing telecommunication room space, capacity and output mode of the existing power supply, capacity of existing batteries and through-current capability of existing cables.

Figure 1 shows evolutionary trends in the telecommunication room.

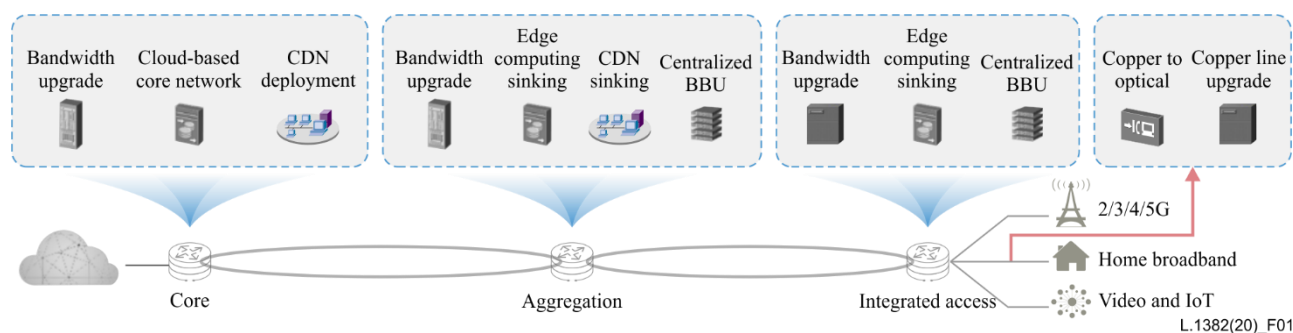


Figure 1 – Evolutionary trends in the telecommunication room

6.1 Telecommunication room classification

5G, home broadband and enterprise services bring bandwidth acceleration of 10 times on the user side of the access network and of 2 to 4 times on the upper-layer metropolitan access network (MAN) and backbone network. Based on the evolution of the future-oriented network and telecommunication room devices, telecommunication rooms can be classified into:

- integrated access telecommunication rooms;
- aggregation telecommunication rooms;
- core telecommunication rooms.

6.2 Telecommunication room evolution

The future evolution of three types of telecommunication rooms is mainly driven by the following trends:

- **integrated access telecommunication room:** bandwidth expansion, edge computing sinking, base band unit (BBU) convergence and evolution into a social telecommunication room;
- **aggregation telecommunication room:** bandwidth expansion, edge computing sinking, CDN sinking, BBU convergence and evolution into a social telecommunication room;
- **core telecommunication room:** bandwidth expansion, core network cloudification, CDN deployment.