

**EXPLANATORY NOTES TO REGULATION  
38**

**ON THE TECHNICAL CHARACTERISTICS  
OF METALLIC LOCAL LOOPS AND NET-  
WORK EQUIPMENT CONNECTED TO THEM**

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## 1 LEGAL MATTERS

The aim of this chapter is to give the reader of the regulation a general overview of the provisions this regulation is based on. The chapter also provides other essentially related provisions.

### 1.1 Legislative basis for the regulation

The regulation relates to the following requirements provided in the sub-sections of section 128 of the Communications Market Act (393/2003, CMA) [1], which state that public communications networks and communications services and the communications networks and communications services connected to them shall be planned, built and maintained in such a manner that:

- 1) the technical quality of telecommunications is of a high standard;
- 4) the protection of privacy, information security and other rights of users and other persons are not endangered;
- 6) the networks and services do not cause unreasonable electromagnetic or other interference;
- 7) they function together and can, if necessary, be connected to another communications network;
- 8) terminal equipment meeting the requirements of the Radio Act can, if necessary, be connected to them.

The obligations to design, build and maintain provided in Section 128 of the Communications Market Act cover all requirements enacted and set for networks and services during their entire life span and even in the event of disturbance.

This regulation specifies the above-mentioned technical requirements of Section 128 by virtue of **the following sections of Section 129**, according to which the regulations of the Finnish Communications Regulatory Authority (FICORA) may cover:

- 4) interconnection, interoperability and signalling;
- 9) the technical characteristics of a local loop;
- 10) communications network security and minimizing interference;
- 20) standards to be complied with.

### 1.2 Other related provisions

This section discusses provisions, the obligations of which are not covered in this regulation, but which are related to the regulation of local loop, or the regulation of the electromagnetic characteristics of network equipment that has been hard-wired to the communications network, and which are worth paying attention to and add value to the whole.

#### 1.2.1 Communications Market Act [1]

*Section 18 of the CMA, Obligations imposed on an operator with significant market power.*  
*Section 19 of the CMA, Obligations imposed on other telecommunications operators.*  
*Section 24 of the CMA, Obligation to lease out part of a local loop and equipment facilities.*

The Act provides a technology-neutral definition for a local loop. In addition to the regulation of the technical quality described above in 1.1., market regulation in accordance with the above-mentioned sections may be focused on the provision of local loops. Regulation 38 only concerns metallic local loops, that is, only part of the local loops referred to in the Act, and only part of their technical characteristics or performance.

#### 1.2.2 EMC regulation for network equipment and fixed installations

FICORA's regulation 22 on conformity assessment, marking and documents relating to telecommunications terminal equipment, network equipment and fixed installation (R22)[2]

Regulation 22 has provisions of the protection requirements for the electromagnetic compatibility of network equipment and fixed installation, and of taking into consideration the purpose of use of network equipment and documentation with regard to fixed installations.

Regulation 22 is based on the Act on Radio Frequencies and Telecommunications Equipment (1015/2001; amendments up to 11/2007 included, Radio Act) [3], which, on the other hand, is based on Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC Directive) [4].

## **2 THE OBJECTIVE OF THE REGULATION AND THE CHANGES MADE TO IT**

The aim of this chapter is to give the user of the regulation information on the objectives and aims of the regulation. This chapter also includes the most important changes made to the obligations and recommendations preceding the regulation.

### **2.1 The objective of the regulation**

In the provision of a broadband subscription or fixed telephone subscription, the customer's technical access network is, despite the growth of fibre and wireless connections, still mostly a metallic local loop. The purpose of this regulation is to ensure that services provided via metallic connection (particularly ADSL and VDSL subscriptions) are effective and disturbance-free, and increase performance and ensure distribution.

### **2.2 Key changes and changes made in the past**

The most significant change to Regulation 38 D is that new obligations have been imposed on the configuration of VDSL in Sections 6 and 7. These restrictions ensure that the disturbances caused by VDSL equipment to existing ADSL connections remain reasonable without substantial drop in the service level of VDSL.

The regulation no longer includes a provision included in the previous version of the regulation (38 C/2007 M, Section 4) on the permittance of components affecting the electric characteristics of local loops. The purpose of the removal of requirements is not to change the current practice, but the need for the regulation of components no longer exists. There is no reason for FICORA to assume that telecom operators would provide their local loops with new pupin coils or balancing capacitors.

Version 38 D excludes a general provision on the application order of standards (38 C/2007 M, Section 3). Standards are referred to separately in paragraphs where mandatory or informative references to standards have been considered necessary. The objective is to gradually make similar specifications to the standard reference practice of all technical regulations.

## **3 SECTION 1 SCOPE OF APPLICATION**

According to Section 2 of Communications Market Act, *local loop* means the part of a fixed telephone network that lies between the subscriber connection and the active network equipment used to route the messages.

This regulation concerns *metallic* local loop, part of a local loop and equipment connected to these.

The regulation does not separately refer to which telecommunications networks or services the regulation is applied, because the terms local loop and metallic twisted pair cables both tie the scope of application to fixed telephone network.

Of equipment, the regulation only concerns network equipment when they form part of a network, that is, *fixed installation* referred to in the Radio Act. Thus, telecommunications terminal equipment or radio equipment fall outside the scope of this regulation.

## **4 SECTION 2 DEFINITIONS**

This chapter discusses the definitions given in the regulation as well as the definitions under the law that relate to the regulation.

#### **4.1 Local loop**

According to Section 2 of Communications Market Act, *local loop* means the part of a fixed telephone network that lies between the subscriber connection and the equipment used to route the messages.

According to the explanatory memorandum to Section 24 of the Communications Market Act (HE 112/2002 p. 128), a local loop extends to the telephone exchange. Correspondingly, as far as broadband subscriptions are concerned, a local loop is considered to extend all the way to the DSLAM.

#### **4.2 Two-wire or multi-wire local loop**

Since 2003, the definition of *two-wire and multi-wire local loop* no longer separates normal and selected connections. The classification was removed as the EC legislation or Communications Market Act do not distinguish between different connection qualities, but are founded on the common minimum regulation of connections.

In addition to the minimum requirements, a telecom operator may implement better characteristics in their local loops, as long as it takes into consideration the non-discriminatory and pricing obligations, which may possibly be imposed under the Communications Market Act, in the relinquishment of access rights of local loop to other telecom operators.

#### **4.3 Part of a metallic local loop**

*A part of a metallic local loop* is defined in such a manner that the definition is harmonized with the provision and reasons concerning the obligation to lease out part of a local loop in accordance with Section 24 of the Communications Market Act: the length of a local loop is regarded as to extend from the user to the centre; a part of a local loop - as far as the regulation of the technical characteristics or the obligation to relinquish access rights are concerned - is restricted to the user at one end, and to a telephone network connection point or network termination point at the other end. In other words, the technical requirements concerning regulation of a part of a local loop do not require any preparedness to provide the possibility to access local loop in any other parts of a local loop than where current network termination points exist, or where a telecom operator builds the possibility to access because it wants to develop its network.

#### **4.4 Network equipment**

Pursuant to Section 4 of the Radio Act, *network equipment* means equipment designed for use in transferring or directing messages in a communications network. Moreover, Section 4 of the Radio Act defines *fixed installation* as a combination of network equipment that is installed in a predefined place for permanent use. And, *telecommunications equipment* means *radio equipment, telecommunications terminal equipment and network equipment*.

Examples of network equipment pertaining to the scope of application of this regulation are, for example, equipment needed for xDSL connection provided via local loop which are not telecommunications terminal equipment or radio equipment, but belong to the communications network, for example, equipment located in concentrator or at the exchange needed for sending a signal.

### **5 SECTION 3 TECHNICAL CHARACTERISTICS OF TWO-WIRE LOCAL LOOP**

The section includes requirement for the required crosstalk attenuation and insulation resistance as well as permitted disturbance voltage. The performance characteristics required in the regulation have remained unchanged for tens of years. The purpose of the requirements is to ensure that the use of a copper pair located close to one another in the cable is possible without unreasonable disturbance.

The new building of copper network has decreased and transferred into supplementary building. In the future, cables will almost solely be used for fast transmission of data which is sensible to the

quality of cable. The objective of the provision is to ensure that the quality of network will not deteriorate in the end.

## **6 SECTION 4 TECHNICAL CHARACTERISTICS OF MULTI-WIRE LOCAL LOOP**

The requirements concern the selection of pairs for multi-wire local loops, as well as installation and electric characteristics in such a manner that the electric characteristics of pairs are sufficiently similar to one another.

## **7 SECTION 5 ELECTRIC CHARACTERISTICS OF EQUIPMENT CONNECTED TO LOCAL LOOP**

According to the regulation, the network connection and purpose of use of equipment to be connected to the local loop must follow standards. The aim of the requirement is not to oblige telecom operators to use equipment that follow certain standards only, but all equipment which meet the requirements of the standards describing equipment meant to be connected to metallic local loops are permitted. However, problems may arise in spite of this, but the risk of disturbance is clearly lower due to the equipment's conformity to standard. Annex 1 has a list of standards that are valid at the time of the publication of the regulation.

The objective of the regulation of the electric characteristics of equipment connected to local loop is to restrict the level of disturbance inside the cable by, for example, preventing a lessor from using non-standard equipment that may cause severe disturbance.

## **8 SECTIONS 6 AND 7 ELECTRIC CHARACTERISTICS OF VDSL EQUIPMENT CONNECTED TO LOCAL LOOP AND PSD MASKS FOR VDSL INSTALLATIONS**

### **8.1 Reasons**

The technical limiting values and PSD masks of the signal sent by the equipment were removed from the requirements in version 38 C/2007 of the regulation. The precise values were replaced by general conformity to standards. Since 2007, VDSL technology has become more common and co-exists with ADSL technology.

VDSL technology may only be used for substantially shorter distances than what the ADSL can be used for. Therefore, the provision of a VDSL subscription often requires that the active equipment of a telecom operator providing a subscription must be brought closer to the end-user than the ADSLAM is located or where it may be placed. Due to a short range, VDSLAM is normally brought to a distance of less than 100 metres from the end-user, either to the street cabinet or house cabinet, and the type of connection is optical fibre. These solutions are widely-known as FTTC i.e. Fiber To The Curb and FTTB i.e. Fiber To The Building. The common feature they share is that part of the local loop is still implemented by metallic connection.

Bringing VDSL to the same cable disturbs the existing ADSL connection which is connected to a concentrator located far away. In these cases, there is need to restrict the spectrum produced by VDSL modems. VDSL recommendation ITU-T G.993.2 [5] gives good possibilities for this by providing configuration characteristics which help to keep the disturbances of ADSL connections to a minimum without substantial deterioration of the performance of VDSL connection.

### **8.2 Application**

New buildings are increasingly connected to the network via optical fibre (FTTB) only, which means that there is no risk of causing disturbance to other systems. Neither is there need to restrict the possibly used VDSL system. Instead, in FTTC cases where VDSLAM is used further in a street cabinet and the building is connected with copper cable to the street cabinet, old ADSL connections may be in use. Unless there are any ways to ensure that ADSL connections exist it may be necessary to restrict the spectrum of VDSL system taking into consideration the attenuation factors of the cable,. At the end of Section 6(2)(3) of the regulation, it is stated that unless local loop has any ADSL connections, it is not necessary to make any restrictions in the VDSL configuration to ensure the functionality of ADSL. Thus, the objective of the regulation is that the telecom operator

providing services to the premises must clarify the installation situation and configure the VDSL system accordingly.

## **9 SECTION 8 ENTRY INTO FORCE**

The regulation is also applied, without transition period, to local loops built prior to the entry into force of the regulation. Thus, all networks and services must comply with the requirements of the regulation when the regulation enters into force.

The planned date of entry into force of the regulation is 1 March 2010.

## **10 RECOMMENDATION ON CONSTRUCTING OPTICAL ACCESS NETWORKS**

On 26 February 2009, FICORA published a working group report on the construction and maintenance of optical access networks (Optical access networks v2 (1/2006)) [6]. In the report, FICORA gives recommendations on the construction and maintenance of optical networks. The objective of the instructions and recommendations published in the report is to help network designers, builders, contractors and investors in the decision making process and create common practices for constructing optical cable networks. The report has a short description of the components of an optical cable network and gives recommendations on the minimum requirements set for these components. In addition, the report describes different topology and architecture alternatives of the network and defines the terminology related to these. Furthermore, the report gives recommendations regarding the design, construction, documentation and maintenance of fibre cable networks.

## **11 REFERENCES**

[1] Communications Market Act (393/2003 incl. amendments, CMA), updated version: <http://www.finlex.fi/fi/laki/kaannokset/2003/en20030393.pdf> amendments up to 119/2008 included

[2] FICORA's regulation 22 on conformity assessment, marking and documents relating to telecommunications terminal equipment, network equipment and fixed installation R22 G/2007, updated version: <http://www.ficora.fi/en/index/saadokset/maaraykset.html>

[3] Act on Radio Frequencies and Telecommunications Equipment (1015/2001 amendments up to 11/2007 included, Radio Act): <http://www.finlex.fi/en/laki/kaannokset/2001/en20011015.pdf> (amendments up to 11/2007 included)

[4] Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC Directive).  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:390:0024:0037:En:PDF>

[5] ITU-T Rec. G.993.2 Very High Speed Digital Subscriber Line Transceivers (VDSL2)  
<http://www.itu.int/ITU-T/index.html>

[6] FICORA, working group report 1/2006, Optical access networks v2, 26 February 2009, <http://www.ficora.fi/index/saadokset/tyoryhmaraportit.html> in Finnish

## 12 ANNEXES

### 12.1 Appendix 1: Standards concerning equipment connected to local loop

According to Section 5 of the regulation, the network connection and purpose of use of equipment to be connected to the local loop must follow standards. This appendix includes a list of standards which are valid at the time of the publication of the regulation.

#### **ETSI:**

(<http://www.etsi.org/WebSite/Standards/Standard.aspx>)

- ETSI TS 101 135 Transmission and Multiplexing (TM); High bit-rate Digital Subscriber Line (HDSL) transmission systems on metallic local lines; HDSL core specification and applications for combined ISDN-BA and 2 048 kbit/s transmission
- ETSI TS 101 270-1 Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements
- ETSI TS 101 270-2 Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 2: Transceiver specification
- ETSI TS 101 388 Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Asymmetric Digital Subscriber Line (ADSL) - European specific requirements; (ITU-T G.992.1 modified)
- ETSI TS 101 524 Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetrical single pair high bitrate Digital Subscriber Line (SDSL)
- ETSI TS 101 524-1 Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetrical single pair high bitrate Digital Subscriber Line (SDSL); Part 1: Functional requirements
- ETSI TS 101 524-2 Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetrical single pair high bit rate Digital Subscriber Line (SDSL); Part 2: Transceiver requirements
- ETSI TR 101 830-1 Transmission and Multiplexing; Spectral management on metallic access networks; Part 1 : Definitions and signal library (ETSI)
- ETSI ETR 080 Transmission and Multiplexing (TM); Integrated Services Digital Network (ISDN) basic rate access; Digital transmission system on metallic local lines. 1996 (ETSI)

#### **ITU-T:**

(<http://www.itu.int/publications/sector.aspx?lang=en&sector=2>)

- ITU-T G.961 Digital transmission system on metallic local lines for ISDN basic rate access
- ITU-T G.991.1 High Bit Rate Digital Subscriber Line (HDSL) Transmission System on Metallic Local Lines
- ITU-T G.991.2 Single-pair high-speed digital subscriber line (SHDSL) transceivers
- ITU-T G.991.2 Amendment 1, Single-pair high-speed digital subscriber line (SHDSL) transceivers
- ITU-T G.992.1 Asymmetrical Digital Subscriber Line (ADSL) Transceivers
- ITU-T G.992.2 Splitterless Asymmetrical Digital Subscriber Line (ADSL) Transceivers
- ITU-T G.992.5 Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2+)
- ITU-T G.993.2 Very high speed digital subscriber line transceivers 2 (VDSL2) + Amendment 1