



Technical Guideline

Name

F-TG-C-01e

Controls
Department

Ethernet Network Connectivity

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Contents

1.	Scope	1
2.	General	1
2.1.	Network Device Registration	1
3.	Ethernet Connection Standards	2
3.1.	Twisted Pair Connections	2
3.2.	Fiber Optic Connections	2
4.	Attached Documents	2

1. Scope

This Technical Guideline defines standards for Ethernet network connectivity, i.e. the standards that all network devices and equipment must comply to.

Since VLAN technology (several logical networks on the same physical network) will be widely used, the scope of this standard is as follows:

- All network devices / equipment being integrated in the accelerator control system, i.e. systems connected to the accelerator controls network,
- All network devices / equipment installed and operated in the FAIR buildings being part of the normal purpose network (e.g. VoIP telephones, etc.).

This guideline does not cover Ethernet devices / equipment being explicitly connected to private networks with independent fibers or cables and separate network equipment, e.g. network for building automation, etc.

2. General

The accelerator network allows twisted pair and fiber optic connections.

Only one MAC address per port is allowed, i.e. there is no support for hubs or virtual machines (without NAT).

Usage of private network switches is prohibited.

2.1. Network Device Registration

Each network edge device must register itself on the accelerator network in the following way:

After link layer setup an edge device has to send unrequested Ethernet packages. These Ethernet packages have to be legal and must contain MAC address of edge device in the MAC source field. So a validation of the edge device by the network is possible. Only upon successful verification, the port will be switched operational.

The verification time is, depending on the used switch, up to 5 seconds. I.e. should the edge device use DHCP, BOOTP, NTP or something else, it has to wait at least 5 seconds for a reply (during verification time only). Standard operating systems, like Linux or Windows, meet these conditions.

A failed verification will attach the network edge device to a guest VLAN.

Every break on the link layer involves a new registration described above.

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		Page 1 of 2	

3. Ethernet Connection Standards

3.1. Twisted Pair Connections

During link layer setup autosensing / autonegotiation (i.e. speed and duplex option) is mandatory. Supported connection standards are:

- 10BASE-T, half or full duplex, IEEE 802.3
- 100BASE-TX, half or full duplex, IEEE 802.3u
- 1000Base-T, full duplex, IEEE 802.3af
- 10GBASE-T, full duplex, IEEE 802.3an

3.2. Fiber Optic Connections

Supported connection standards are:

- 1000BASE-X, full duplex, IEEE 803.3z
- 10GBASE-FX, full duplex, IEEE 802.3ae

4. Attached Documents

List of abbreviations for controls (Abbreviations_Controls.pdf).