Useful Fibre Channel Terminology

This glossary contains terms and acronyms that may be found in Gadzoox documentation.

Agent

A management entity within a Gadzoox product that can perform certain specialized configuration and control functions.

AL_PA

Arbitrated Loop Physical Address. The low-order byte of a 3-byte Fibre Channel Source/Destination ID field that defines an address hierarchy. This is also called a Loop ID. See D_ID or S_ID.

AL_PD

A destination AL_PA.

AL_PS

A source AL_PA.

ANSI

American National Standards Institute, the organization that coordinates voluntary standards for programming languages, telecommunications, properties of disk and tape media, and more in the United States.

Arbitrated Loop

A Fibre Channel standard defining a loop topology where up to 126 devices can communicate with one another using an arbitrated access protocol.

Arbitration

The process of selecting one respondent from a collection of several candidates that request service concurrently.

Area

See Fibre Channel Address.

Bandwidth

The amount of data per second that can be transferred from one device to another. Bandwidth limits are set by a combination of speed of transfer, capacity of the pipe, number of pipes, and overhead of sending the data. It is possible to transmit one signal at the maximum specified bandwidth, or several different signals simultaneously on different channels, each of them using a portion of available bandwidth.

BLS

Basic Link Services (also known as Link Service). A Fibre Channel request/response protocol common to all devices. The most universally implemented Basic Link Service is Abort Sequence (ABTS), used for error recovery.

Broadcast

A transmission sent to all N_Ports on a network.

Bypassed port

A port status that indicates a port is not enabled on a loop, even though the port is still physically connected to the network. A bypass can be automatic or manual.

Cascade

A multiple hub or switch configuration with either a tree-like or a linear chain-like structure.

Channel

A pathway between components in a computer system or between workstations in a network.

Cluster

A group of systems that work together as a single system to provide fast, uninterrupted service. It is a way to increase capacity and to add I/O bandwidth.

Credit

A numeric flow control value that establishes advance permission to send one or more frames. It is used for either end-to-end or buffer-to-buffer Class-2 frames. As long as a port has a credit of greater than 0, it can continue to send frames. Credit is granted by a port during the login process.

Datagram

Datagram refers to an unacknowledged Fibre Channel frame or frame sequence, borrowed from networking terminology. The Fibre Channel standards use it specifically to refer to the type of unacknowledged service defined by Class 3 delivery.

Device

See FC-AL Device.

D_ID

Destination ID. A Fibre Channel Address of a frame defining the destination node for that frame.

Diplex Communications

In addition to full duplex communications between a pair of nodes, a node can receive from another node, while simultaneously transmitting to a third node independently.

Domain

See Fibre Channel Address.

Duplex (full)

Operation of a data communication link where transmissions are possible in both directions simultaneously.

Duplex (half)

Operation of a data communication link where transmissions are possible in both directions, but only in one direction at a time.

ELS

Extended Link Services support messaging protocol for discovery and dynamic address partitioning.

EMC

ElectroMagnetic Compatibility.

Embedded Node Agent

An in-band Node Agent conducts automatic discovery and display of SCSI and SES targets, SES enclosures.

Enclosure

The box, rack, or set of boxes containing one or more devices. It can provide power, cooling, and other support functions to the devices.

E_Port

Expansion Port. It specifies the interconnection and initialization for a Fibre Channel switch to create an inter-

switch link. It is similar to an N_Port and an F_Port.

Fabric

Fibre Channel-defined interconnection methodology that handles routing in Fibre Channel networks.

FC-0

The set of Fibre Channel standards that address media (optics, copper, connectors), and physical signalling over that media (signal rates and timing, signal quality, power, jitter, etc.).

FC-1

The set of Fibre Channel standards that address 8B/10B encoding/decoding and transmission protocol.

FC-2

The set of Fibre Channel standards that address link protocols: framing, flow control, link services, and error recovery.

FC-3

The set of Fibre Channel standards that define additional services which are available to all FC-4 protocols, yet are not part of the link layer.

FC-4

The set of Fibre Channel standards that define the mapping of higher level protocols (primarily IP and SCSI initially) to Fibre Channel link protocols and services.

FC-AL Device

A device that employs Fibre Channel-Arbitrated Loop and consists of one or more NL_Ports.

FC-PH

Fibre Channel Physical standard consisting of three lower levels, FC-0 physical, FC-1 encoding, and FC-2 framing and signalling.

FC-SW

Fibre Channel Switch standard that specifies tools and algorithms for interconnection and initialization of Fibre Channel Switches to create a multi-switch Fibre Channel fabric.

Fiber

Refers to the strands of glass through which data in the form of light pulses are transmitted in fiber optic cable. It is used for high-speed transmission over medium to long distances.

Fibre

An FC-AL term used to cover all transmission media types specified in the Fibre Channel Physical Layer standard (FC-PH), such as optical fiber, copper twisted pair, and copper coaxial cable. Fibre is not exclusively optical fiber.

Fibre Channel (FC)

An ANSI T11 standard which provides high-speed, high-reliability data transfers among computing devices, storage devices, and networked equipment. It defines a bi-directional, full-duplex serial data channel at speeds of 1 Gigabit per second and higher, over distances up to 30 km. Current implementations support the transport of SCSI and IP protocols over switched and loop network topologies.

Fibre Channel Address

A 3-byte address defining a destination or source node (N_Port, NL_Port, etc.) There are 256 ports within each Area (only half of which are usable on FC-AL), 256 Areas within each Domain, and 256 Domains.

Table 1: Fibre Channel Address

Bits 23-16	Bits 15-8	Bits 7-0
Domain Address	Area Address	Loop Address

Fibre Channel Arbitrated Loop (FC-AL)

A Fibre Channel workgroup topology supporting up to 126 devices without the use of fabric protocols. Media access is performed through arbitration. Switching and fabric features can be supported through the use of infrastructure products such as hubs, switches, bridges, routers, and embedded management agents and services.

F_Port

Fabric Port. A port on a fabric switch to which N_Ports may be directly connected. The F_Port is not capable of communicating with FC-AL protocol.

FL_Port

Fabric Loop Port. An F_Port that is capable of supporting an attached Fibre Channel Arbitrated Loop. An FL_Port on a loop will have the AL_PA hex '00' giving the fabric the highest priority access to the loop. N_Ports or NL_Ports can attach to it in an Arbitrated Loop topology and are capable of communicating with FC-AL protocol.

FPGA

Field Programmable Gate Array is a hardware device to which you download code that determines the set of capabilities for that device.

Full Duplex Communications

A pair of nodes can both simultaneously send and receive data between each other for an aggregate of 2 Gbps, effectively doubling the communications rate between the two nodes.

Frame

The smallest unit of information carrying user data and protected by Fibre Channel error control and recovery. Up to 2112 bytes per frame can be transported.

GBIC

Gigabit Interface Converter. It is a connector that offers flexible choice of media and transmission technology.

Gigabit

One billion bits or one thousand megabits. It is generally used to refer to bandwidth.

HBA

Host Bus Adapter is a card that connects FC peripherals and server host buses such as PCI and others. It also requires a device driver.

Hub

A central connecting device in a network that joins communication lines into a star configuration.

In band

"In bandwidth". Using the same bandwidth (wires or data channel) for signaling as for data transmission.

IntraCom

A Gadzoox proprietary out-of-band communications protocol used between managed hubs and area switches that enables topological and proxy management.

IP

Internet Protocol. A protocol designed for use in interconnected systems of packet networks.

Jitter

Unwanted variations in the frequency or phase of a digital or analog signal due to varying time delays in the circuit paths from component to component in the signal path. Jitter can result in errors and data corruption.

LAN

Local Area Network. A communications system whose geography covers less than 5 kilometers. Transmissions within it are mostly digital, carrying data among stations at rates usually above 1 Mbit/sec.

Latency

The time delay of data traffic through a network or a switch.

LILP

Loop Initialization Loop Position map is the accumulation of all of the information reported in the LIRP frames. It is optionally sent out by the initalization master at the end of the initialization sequence.

Link

In this context, it is a pair of fibers (RX for inbound and TX for outbound) that carries information to and from a port. It is also called a channel.

LIP

Loop Initialization Primitive. A Fibre Channel Primitive Sequence transmitted by FC-AL devices and infrastructure to signal a potential topology change, and to put all devices attached to a loop into the same state for the purposes of Loop Initialization and Loop Address administration. It can include LISM, AL_PA assignment, and building a positional map of the loop.

LIRP

Loop Initialization Report Position establishes a position map which is a table of all the AL_PAs on a node. See also LIFC.

LISM

Loop Initialization Select Master is the process used to determine the temporary loop master as part of the LIP.

Long Wave

Lasers or LEDs that emit light with wave lengths around 1300 nm. Long wave lasers are used for long Fibre Channel links, from ~700-2000m. They are typically used with single-mode fiber with a 9-micron core size.

Loop ID

A unique 7-bit value from 0 to 126 that represents the 127 valid AL_PAs (physical addresses) on a loop.

L_Port

Loop Port. It only has the capability to communicate over FC-AL hubs and through FL_Ports.

LPSM

Loop Port State Machine. It resides on each loop-capable port and is responsible for performing the loop protocols and the repeater function to pass information through.

MAC Address

Media Access Control address. It is the 48-bit (12 digit hexadecimal), IEEE 802.1, Universal LAN MAC address (ULA). It is constructed from the 24-bit IEEE company ID and a 24-bit vendor-specified identifier associated with an Ethernet port. It is also used to construct the Worldwide Name. (See Table 13:)

Table 2: MAC Address

Bits 47-24	Bits 23-0
24-bit IEEE company ID assigned to Gadzoox.	24-bit vendor ID assigned to a unit by Gadzoox before shipping.

Managed Object

A data variable that represents a resource or other aspect of a managed device.

MIB-II

Management Information Base. A set of inter-related managed objects. The attributes of these objects have network monitoring values whereby an SNMP agent can access management instrumentation and at least one management station from where a network manager can collect statistics and a management protocol to exchange information between the agents and the management station.

Mirroring

The technique of duplicating the data from one disk onto another in real time, so that if the primary drive fails, data can be immediately recovered from the secondary drive. Mirroring is also known as RAID-1. The advantage is that it is simple and does not necessarily require an array controller, and it is fast to store and recover. The disadvantage is that it is the least efficient of the RAID types since it requires twice the amount of storage as simple direct storage.

Multicast

Data that is sent to a group of N_Ports in a fabric in parallel.

Network

A collection of interconnected components and the protocols and physical methods those components use to communicate. Network components consist of network elements (infrastructure components) and network attachments (devices which use the network to communicate). A Storage Area Network is a network whose elements consist of computing devices, storage devices and storage subsystems. The predominant SAN protocol used is currently Fibre Channel.

NL_Port

Node Loop Port. It has the capability to communicate over both FC-AL hubs and through F_Ports.

Node

A node is a device that has at least one N_Port or NL_Port to provide access to a Fibre Channel SAN.

Node Agent

A management entity within a Gadzoox product consisting of hardware and embedded firmware which provides in-band management communication to Fibre Channel ports.

N_Port

Node Port. It only has the capability to communicate through an F_Port. It is a port on a computer, disk drive, etc., through which the device does its Fibre Channel communication as a direct fabric-attached port for use with point-to-point or fabric topology. It is identified by a Worldwide Name.

N_Port ID

The Fibre Channel Address that a node sends in the S_ID of each frame it sources, and the Fibre Channel Address that a node responds to in the D_ID of each frame it receives. If a Fibre Channel node receives a frame which contains a D_ID not equal to its N_Port ID, it is considered a delivery error and the frame is discarded. See Table 14 for its structure.

Table 3: N_Port ID

Byte 2 Bits 23-16	Byte 1 Bits 15-8	Byte 0 Bits 7-0
Domain	Area	Loop (AL_PA)

OFC

Open Fibre Control is a defunct FC-0 signalling protocol used to provide eye safety for optics which are not intrinsically eye safe based on their optical power. All interoperable Fibre Channel ports use non-OFC optics.

Out-of-band

Using a separate channel for signaling to ensure full bandwidth availability for its primary purpose. For example, although more costly, it ensures full bandwidth availability for voice or critical data transmission.

PLDA

Private Loop Direct Attach. A profile that defines an interoperable FC-AL implementation.

Policy-Based Initialization (LIP) Management

Capellix provides user programmable policy based management of LIPs that interrogate the subject node and determine where and when a LIP should be permitted to propagate.

Port

A hardware pathway into and out of a node that performs data communications over the FC link. For example, a "dual-ported" device has two separated pathways by which data can be transferred.

Private Loop

A Fibre Channel Arbitrated Loop that stands on its own and is not connected to a fabric.

Protocol

A set of conventions or rules used by a program or operating system to communicate between two or more endpoints. Examples include IPX, TCP/IP, and AppleTalk. Though the protocols differ, they all allow information to be packaged, sent from a source, and delivered to a destination system.

Proxy

An agent that acts on behalf of some other network element. A management station sends queries about a device to its proxy agent that is responsible for gathering the device information, returning it, or issuing alerts.

Public Loop

A Fibre Channel Arbitrated Loop that is connected to a fabric.

RAID

Redundant Array of Inexpensive Disks. It is a disk subsystem that appears as a single, large, fast disk drive, even though it is in reality composed of an array of drives.

RFI

Radio Frequency Interference.

Ring

A configuration of computing devices interconnected in a ring shape. The communication between any two points always includes all of the intermediate points.

Router

A device connected to two or more networks that decides which network to send the data. It is often used in SANs to connect SCSI devices to Fibre Channel networks.

SAN

Storage Area Network. This Gadzoox-created concept brings networking to storage. It is a highly scalable, managed, server-storage infrastructure that offers gigabit speed data connectivity, high system availability, extensive fault tolerance, and low cost of ownership.

Scalability

The ability of a system to incrementally increase connectivity and performance.

SCSI

Small Computer System Interface. There are several variations that range from an 8-bit interface for up to 7 peripherals to a 16-bit interface for up to 15 peripherals. It is commonly used for many types of peripherals such as disks, printers, scanners and just about anything else.

Short Wave

Lasers or LEDs that emit light with wave lengths around 780 nm or 850 nm. Short wave lasers are used for FC-AL links up to ~700m. They are typically used with multimode fiber. A fiber core size of 50 microns provides greater performance than 62.5 micron fiber, which is supported for compatibility with existing wiring networks, for example, FDDI.

S_ID

A Fibre Channel Address of a frame defining the source node for that frame.

SNMP

Simple Network Management Protocol. A protocol used to examine and change configuration parameters and counters of network-connected devices. Agents (software running in the monitored/controlled devices) communicate with management consoles and store variables as counters, or in simple tables. The variables are defined by MIBs.

SNMP Agent

A management entity consisting of hardware and embedded software which responds to SNMP requests over Ethernet from an SNMP manager.

Star

A configuration of computing devices within a LAN where each user is connected by links radiating out from a central connection point such as a hub.

Switch Port

A port on a device that can directly connect two devices together through switch connection. The Capellix is such a switch.

Topology

The physical or logical layout of nodes on a network.

WWN

Worldwide Name. It defaults to the lowest value MAC Address assigned to any port.

WW Port Name

Worldwide Port Name. To ensure global uniqueness, the MAC Address prepends 16 bits to create a 64-bit identifier. The first 4 bits are a Network Address Authority (NAA) controlling authority identifier. The next 12 bits are 0-padded. When NAA=1, it means that the WW Port Name follows IEEE 802.3A Universal LAN MAC addressing. Fibre Channel requires each port to assign an unchangeable WW Port Name. See MAC Address and see Table 15.

Table 4: WW Port Name Address

Bits 63-60	Bits 59-48	Bits 47-24	Bits 23-0
NAA = 1 IEEE 802.3A format	0-padded	24-bit IEEE company ID assigned to Gadzoox.	24-bit vendor ID assigned to a unit by Gadzoox before shipping.
		<-- The MAC Address -->	

ULP

Upper Layer Protocol. The protocol that runs on top of Fibre Channel through the FC-4 layer. Well known ULPs that run over Fibre Channel are SCSI and IP.

Zoning

The ability to divide a SAN into a number of independent zones for binding targets to initiators. This allows a logical mapping of a physical configuration.