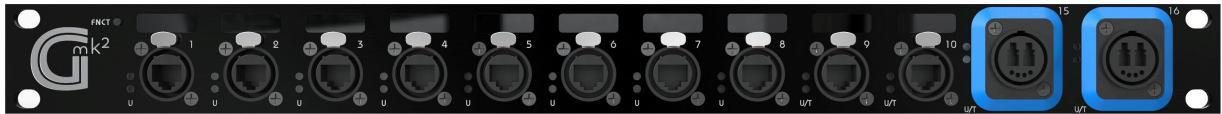


Ghost Mk2 User's manual

Firmware version 1.12.0

H-DC Firmware version 1.0.3

Agora Controller Software version 2.2.X



AGORA

43 Avenue de Châtellerault

86440 MIGNE AUXANCES

FRANCE

France

web site: www.agora-network.fr

In accordance with the company policy of continuous upgrade and products improvement, specifications and functions are subject to change without prior notice. This document was true at the time of writing, please contact our local distributor or visit our website to date with the latest updated versions.

IMPORTANT SAFETY INSTRUCTIONS



This symbol signifies the presence of uninsulated dangerous voltage within the product's enclosure that may be sufficient to constitute a risk of electric shock for persons.



This symbol is intended to alert the user to the presence of important operating and maintenance instructions in the literature joined to this product, particularly in this document.

- 1 Read these instructions.
- 2 Take in consideration.
- 3 Follow all instructions.
- 5 Do not use this device near water.
- 6 Clean only with a dry cloth
- 7 Do not close any ventilation or air-cooling reserved space.
- 8 Install in accordance with the manufacturer's instructions.
- 9 Do not install near any heat source as radiators, or other devices that produce heat.
- 10 Do not remove the grounding electrical connection. This device must be powered with three ways IEC 13 shucko (L/N/G).
- 11 Only use fixations and accessories specified by the manufacturer.
- 12 Unplug this device during maintenance service and when one of its hoods is removed.
- 13 Unplug this device when unused for long periods.
- 14 Use one or two twice power cords to disconnect the device from the mains. The device is not equipped of main power switch.
- 15 To reduce the risk of electric shock or fire, do not expose this device to rain, water, or any liquids and ensure that no objects which contains liquids are placed on the equipment.



EC DECLARATION OF CONFORMITY

1. Product identification: Ghost-Mk2-HRPS-OPTKMM-OPTKSM
2. Name and address of the manufacturer or his authorized representative: AGORA SAS

43, Avenue de Châtellerault – 86440 MIGNE-AUXANCES - FRANCE
3. This declaration of conformity is issued under the sole responsibility of the manufacturer:
AGORA SAS
4. Object of the declaration:
 - Ghost Mk2
 - HDMM/OC: Optical fiber DUAL OpticalCon NEUTRIK - Multimode - on front
 - HDSM/OC: Optical fiber DUAL OpticalCon NEUTRIK - Singlemode - on front
 - HQMM/OC: Optical fiber QUAD OpticalCon NEUTRIK - Multimode - on front + recovery of fiber 3/4 on the rear panel OC DUAL
 - HQMM/OC: Optical fiber QUAD OpticalCon NEUTRIK - Singlemode - on front + recovery of fiber 3/4 on the rear panel OC DUAL
 - HRPS: Redundant Power supply option for Ghost series

5. The object of the declaration described in point 4 is in conformity with the relevant Union harmonization legislation:

- Low voltage Directive 2014/35/EU of 26 February 2014
- Electromagnetic Compatibility Directive 2014/30/EU of 14 October 2014
- Radio Equipment Directive (RED), 2014/53/EU of 22 May 2014
- ROHS2 Directive 2011/65/EU of 7 January 2011

6. References to the relevant harmonized standards used, or references to the specifications in relation to which conformity is declared:

- 2004/108/EC: EMC Directive
- 2006/95/EC: Low voltage Directive

Signed for and on behalf of:

MIGNE-AUXANCES – FRANCE – March 31st, 2021

David ROCHER, CEO



END USER LICENCE AGREEMENT

The following are the license agreements applicable for Ghost™ equipment and software suite.

IMPORTANT – Please read this document carefully before using the Ghost™ and Agora™ products. This agreement governs you for use of software installed on Ghost™ engines or on other machine, as well as other software that we provide for installation of this product. This Ghost™ product range will not operate according to this document without software list and instructions described below.

THIS LICENSE STATES THE TERMS AND CONDITIONS UPON WHICH AGORA COMPAGNY OFFERS TO LICENSE THE H1 EMBEDDED PROGRAMS (ALSO CALLED “FIRMWARE”) AND USER COMPUTER INSTALLED PROGRAMS (ALSO CALLED “SOFTWARE”) WICH HAS BEEN INSTALLED BY OR FOR WICH IT IS PROVIDED. BY USING THIS PRODUCT, YOU WILL BE AGREEING TO BECOME BOUND BY TERMS OF THIS LICENSE. IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS OF THIS LICENSE? PLEASE DO NOT USE THIS PRODUCT AND RETUR IT TO THE PLACE WHERE YOU OBBTAINED IT FOR A FULL REFUND. YOU AGREE TO NOTIFY ANY PERSONS YOU PERMIT TO OPERATE THIS PRODUCT OF THE TERMS OF THIS LICENSE.

The H1™ Controller software is licensed, delivered for free to use only under the terms of this license. The Company reserves all rights not expressly granted to you. The Company retains ownership of all copies of the Software and the firmware, and all proprietary parts of it, including files stored in the product.

1. **License:** Subject to the terms and conditions of this agreement, the Company credit you and other persons you permit to operate the product, a personal, limited, non-exclusive and non-transferable license to use the Software only on Windows OS licensed computers, and the firmware only on the single product in which it has been installed.
2. **Restrictions:** The Agora Controller software package and the joined written materials and documents are copyrighted and contain trade secrets and other proprietary matter, including confidential information relating to the specifications and performance characteristics of this product. Save for such elements described in the chapter 5 as may be licensed to the Company, all rights to copyrights, trademarks and secrets, or any modifications of this Product are owned by the Company. Unauthorized use or copying of the Company’s proprietary Software, or any portion, or copying of those written materials is prohibited. You don’t may create, transfer, market or distribute whole or partial copies of the Company’s proprietary Software to others or duplicate, rent, lease or loan that Software except that you may transfer that installed in this product in conjunction with the sale, transfer, lease or rent of the product and subject at all times to this license.

YOU MAY NOT REVERSE ENGINEER, DECOMPILE, DISASSEMBLE, EXTRACT OR SEPARATE OUT, MODIFY, ADAPT OR TRANSLATE THE SOFTWARE, DERIVE THE SOFTWARE SOURCE CODE ORE DREATE DERIVED APPLICATIONS OR ANY ACCOMPANYING WRITTEN MATERIALS BASED ON THE SOFTWARE.

In the case you violate any term of this license, all rights granted will be automatically and definitively terminate and you must stop using this Software and destroy any copies.

3. **Limited Warranty:** Subject to your installation of any Software updates issued by the Company as described herein, and the condition below, the Company warrants that the Software will operate in compliance with the Software's material specifications and documentation for a period of 120 days from your purchase of this Product. The Software is provided "as is" and the Company does not warrant that the operation of the Software will meet your requirements or operate free from error. To the greatest extent

permissible by law, the Company DISCLAIMS ALL WARRANTIES AND CONDITIONS, EITHER EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT OF THIRD-PARTY RIGHTS OR CAPABILITY OF CORRECTLY PROCESSING PROVIDING AND/OR RECEIVING DATE INFORMATION. You understand that the Company may update or revise the Software but in so doing incurs no obligation to furnish such updates to you. However, the Company may in its discretion make updates available from time to time upon such terms and conditions as it shall determine. It is a condition of the above warranty that you install any such Software updates, as may be issued from time to time by the Company for the Software, in accordance with the Company's instructions, and if you do not do so such warranty will cease to apply. You may view current Software updates at <http://www.agora-network.fr>.

4. **Limited Liability:** THE ENTIRE RISK ARISING OUT OF YOUR USE OR PERFORMANCE OF THE SOFTWARE REMAINS WITH YOU. THE LIABILITY OF THE COMPANY FOR ANY CLAIMS ARISING OUT OF THIS LICENCE AND/OR BASED UPON THE SOFTWARE, REGARDLESS OF THE FORM OF ACTION, AND INCLUDING WORK STOP, PRODUCT MALFUNCTION OR ANY OTHER COMMERCIAL LOSS OR DAMAGE, SHALL NOT EXCEED THE COST OF THE LICENCE FEE FOR THE SOFTWARE OR THE COST OF THIS PRODUCT. SUBJECT TO THE PROVISIONS OF APPLICABLE LAW, IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY LOSS OF DATA, LOST OPPORTUNITY OR PROFITS, COST OF COVER OR SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR INDIRECT DAMAGES, EVEN IF YOU ADVISE THE COMPANY OF THE POSSIBILITY OF SUCH DAMAGES. THIS IS A FUNDAMENTAL TERM OF THIS AGREEMENT AND YOU ACKNOWLEDGE THAT THE AMOUNT YOU PAID FOR THE SOFTWARE AND/OR THE PRODUCT REFLECTS THIS ALLOCATION OF RISK. NOTHING IN THIS PARAGRAPH PURPORTS TO EXCLUDE OR LIMIT THE COMPANY'S LIABILITY FOR DEATH OR PERSONAL INJURY CAUSED BY NEGLIGENCE OR ANY OTHER LIABILITY WHICH CANNOT BE EXCLUDED OR LIMITED BY LAW.
5. **Third-Party Programs:** As referred to herein, the term "Software" refers only to proprietary Agora Controller, owned by the Company that has been provided to you for installation on, or already installed in, a Product. In addition to the Software, you may have also been provided, at no additional charge, with a version of the TP Link™ switch embedded OS installed in flash memories of the Product's mother boards. Mother board has its own applicable end user license agreement; you can keep a copy by contacting support@agora-audio.com
6. **Exit of agreement.** This License will terminate immediately if you violate any of the License terms. Upon termination you must discontinue use of the Software, and either destroy, erase or return to Company all copies of the Software in your possession, custody or control, including those in or on the Product.
7. **General terms.** This License constitutes the entire agreement between you and the Company with respect to this Software and save in the case of fraud, supersedes any other communication (including advertising). Company reserves all rights not expressly granted to you in this license. If any provision of this License is held unenforceable, that provision shall be enforced to the maximum extent permissible to give effect the intent of this License, and the remainder of this License shall continue in full force and effect. This License shall be governed by French law and the Courts of France will have exclusive jurisdiction to hear and decide any conflict concerning it or its formation. No breach by you of any provision of this License shall be waived or discharged except with the express written consent of the Company and no failure or delay by the Company to exercise any of its rights under this License shall operate as a waiver thereof and no single or partial exercise of any such right shall prevent any other or further exercise of that or any other right. You acknowledge that the Company could be irreparably damaged if the terms of this License were not specifically enforced and agree that the Company may seek appropriate equitable remedies with respect to breaches of this License, including injunctive relief, in addition to such other remedies as the Company may otherwise have available to it under applicable laws.

CONTENTS

Chapter 1	Getting Started Unpacking Installation
Chapter 2	General information
Chapter 3	Ghost Mk2 architecture
Chapter 4	Configure Ghost Mk2
Chapter 5	Ghost Mk2 topologies examples
Chapter 6	Ghost Mk2 H-DC
Chapter 7	Service and Maintenance information

CHAPTER 1: Getting Started

Before installing, setting up or operating this equipment, make sure you have read and fully understand all of the “IMPORTANT SAFETY INSTRUCTIONS” at the end of this document.

Important: You must set up the IP address and netmask of your computer (PC Windows 10 32/64 bits or MAC OS X) before using it for the first time.

Unpacking

Carefully unpack your Ghost Mk2 equipment package. Then, inspect the device for any signs of damage that may have occurred during transit and notify the courier immediately if you discover any. Please retain the original packing in case you should need to return the equipment to the manufacturer or supplier, or transport or ship the unit later.

Installation

When installing the unit, take the following into consideration.

- Do not install the equipment in places of poor ventilation.
- Do not install this equipment in a location subjected to excessive heat, dust, or mechanical vibration.

Allow for adequate ventilation around the equipment, making sure that its vents are not obstructed. To prevent excessive heating of the equipment, avoid mounting it directly above power amplifiers or other devices that radiate significant amounts of heat, such as radiators and heaters. Keep the equipment out of direct sunlight.

- This 1U rack unit is designed for mounting in any 19” EIA standard rack. . Four rack-mount holes in the front panel are provided for rack mounting and are designed to fully support the weight of the unit in the rack. **Avoid over-tightening the rackmount screws, as this could damage the front panel.**

Handling the Equipment

Completely isolate the equipment electrically and disconnect all cables from the equipment before moving it. When lifting or moving the equipment, always take its size and weight into consideration.

EMC Regulatory Statements

Europe CE (EN55022)

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

U.S.A.FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area may cause interference in which case the user will be required to correct the interference at his own expense.

Canada

This product complies with Class A Canadian EMC requirements. CAN ICES-3 (A) / NMB-3 (A)
Changes or modifications not expressly approved by Agora could void the user's authority to operate the equipment.

Australia/New Zealand

This product complies with Australia/New Zealand EMC Class A requirements.

Electric fields

Caution: In accordance with Part 15 of the FCC Rules & Regulations, "... changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

These are safety class I products and have protective earth terminals. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

For LAN cable grounding:

- If your LAN covers an area served by more than one power distribution system, be sure their safety grounds are securely interconnected.
- LAN cables may occasionally be subject to hazardous transient voltages (such as lightning or disturbances in the electrical utilities power grid). Handle exposed metal components of the network with caution.

In accordance with EN 60950-1 the base of power socket must be installed near the equipment and must be free of access for the disconnection of the power supply in case of danger.

About this manual

This is the operator manual for the Ghost Mk2 unit and the Agora Controller. It is intended to help get your units installed and in operation as quickly as possible by giving you unpacking, installation, connection, configuration and setting up instructions.

To help familiarize you with the units, there is a description of the front and rear panels, along with easy-to-follow user instructions.

Trademarks

Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and other countries.

Apple and OS X are registered trademarks of Apple Corporation in the United States and other countries.

OpticalCon is registered trademark of Neutrik Group in Liechtenstein

SmartBeam is registered trademark of Klotz GmbH in Germany

Chapter 2: General Information

Thank you for purchasing an Agora Ghost Mk2. The Ghost Mk2 System is a user-friendly, high-performance, network switch especially designed to meet the requirements of AV IT professional's applications.

GHOST, FAST2 and H1 units complement each other. All these devices can coexist in the same network topology. Your Ghost Mk2 was developed by Agora to offer AV professionals a high-performance network switch equipment, designed to provide no-compromise network builder and an easy-to-use interface to build the most complex networked system in a minimum of time.

All this is backed up, of course, by five years warranty for all materials and accessories.

Finally, enjoy your Ghost Mk2 network switch system!

About

The **Ghost Mk2 System** provides:

- One fully configurable switch with by default:
 - 11 User ports (8 Ethercon™ on the front panel (1 to 8) and 3 Ethercon™ on the rear panel (11 to 13))
 - 1 Control Port on the rear panel (14).
 - 6 Transmit ports for units interconnexion:

9/10: Gigabit Ethercon™ port on the front panel.

15 to 18: Optional 1G or **Dual speed 10G/1G** OpticalCon™ or SmartBeam™ Duo ports in Singlemode or Multimode (chosen at purchase)

- A Status/Traffic LED is appointed on each port.
- 250 User Groups manageable by Agora Controller software
- The User ports are appointed of a Group ID LED fully manageable in the Agora Controller.
- Port roles:

Ports 1 to 8 can only be User ports (marked as U)

Ports 9 to 14 can be either User, Transmit or Control ports (marked as U/T)

Optional 15 and 16 ports can either be User, Transmit ports (marked as U/T)

Optional 17 and 18 ports can only be Transmit ports (marked as T)

The unit is equipped by a redundant power supply unit.

Optical fiber ports must be connected in Single mode OR Multimode.

UNDER **NO** CIRCUMSTANCES A MULTIMODE PORT CAN BE CONNECTED TO A SINGLE MODE.

Quad option (chosen at purchase): Unused dual fibers of 17/18 ports are reported to the Back panel on Optical Duo ports.

Chapter 3: Ghost Mk2 architecture

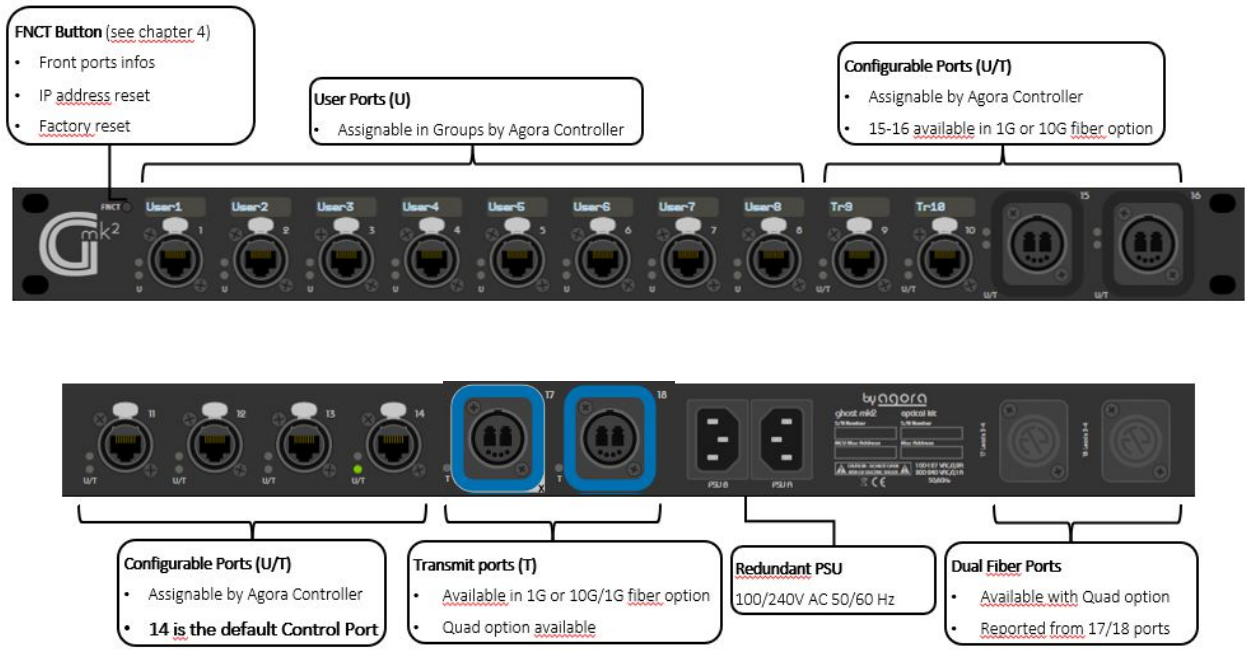


Fig.1 Ghost Mk2 External configuration



Fig.2

10/1Gbps ports (X symbol)

versus 1Gbps ports

(Left : multimode / Right : Singlemode)

Chapter 4: Configure Ghost Mk2

Connect your computer to a Control Port of your Ghost Mk2. **Port 14** is the default control port.

Press the Function button 4 times to see the actual Control Port of the device.

If no Control Port is assigned to the Ghost Mk2, use the control port from another Agora device connected via Transmit ports.

For general connection and configuration of Agora devices, please refer to the Agora Controller User's manual at <https://www.ghost-network.com/support-downloads/>



Fig.3 Ghost Mk2 in Agora Controller

FNCT Button

From stand-by LCDs state:

- Press FNCT Button once: show Ports Labels
- Press twice: show Ports speed
- Press three times: show Ports Utilization (Rx – Tx %)
- Press four times: show Control Port (higher Port number if multiple Control Ports)

- Press five times: **Factory reset** menu
Press Hold and Press Hold again to Reset the device to Factory configuration (no Group, no Label, default IP address). The device will reboot after this operation.

- Long Press FNCT Button: show IP address/Subnet Prefix and Hostname
Press Hold and Press Hold again to Reset the IP address at 192.168.1.101/24
Press Hold, Press once and Press Hold to Reset the IP address at 169.254.1.101/16



Fig.4 10Gbps optional Fiber ports can also be set to 1 Gbps speed.



Fig.5 optional Fiber ports 15&16 can also be configurable as User ports.

Chapter 5 : Ghost Mk2 topologies examples

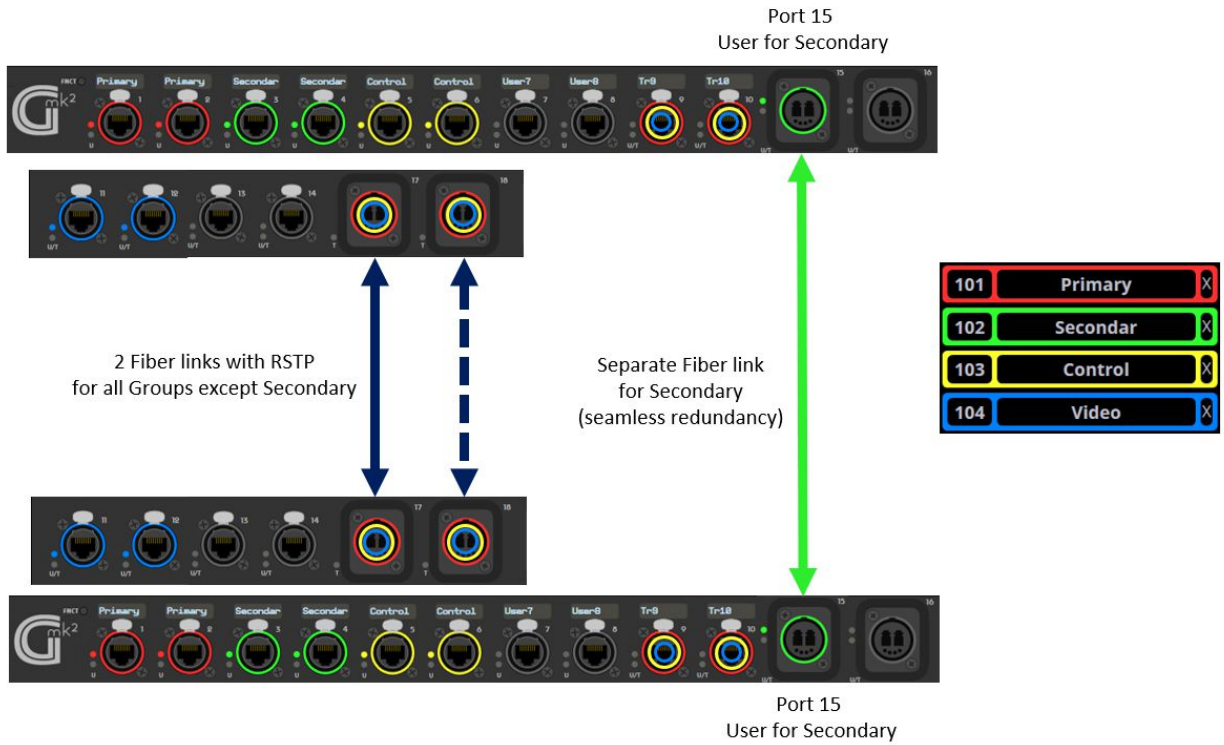


Fig.6 Example of User fiber port for a seamless redundancy
(i.e Redundant Dante or ST2110 protocols)

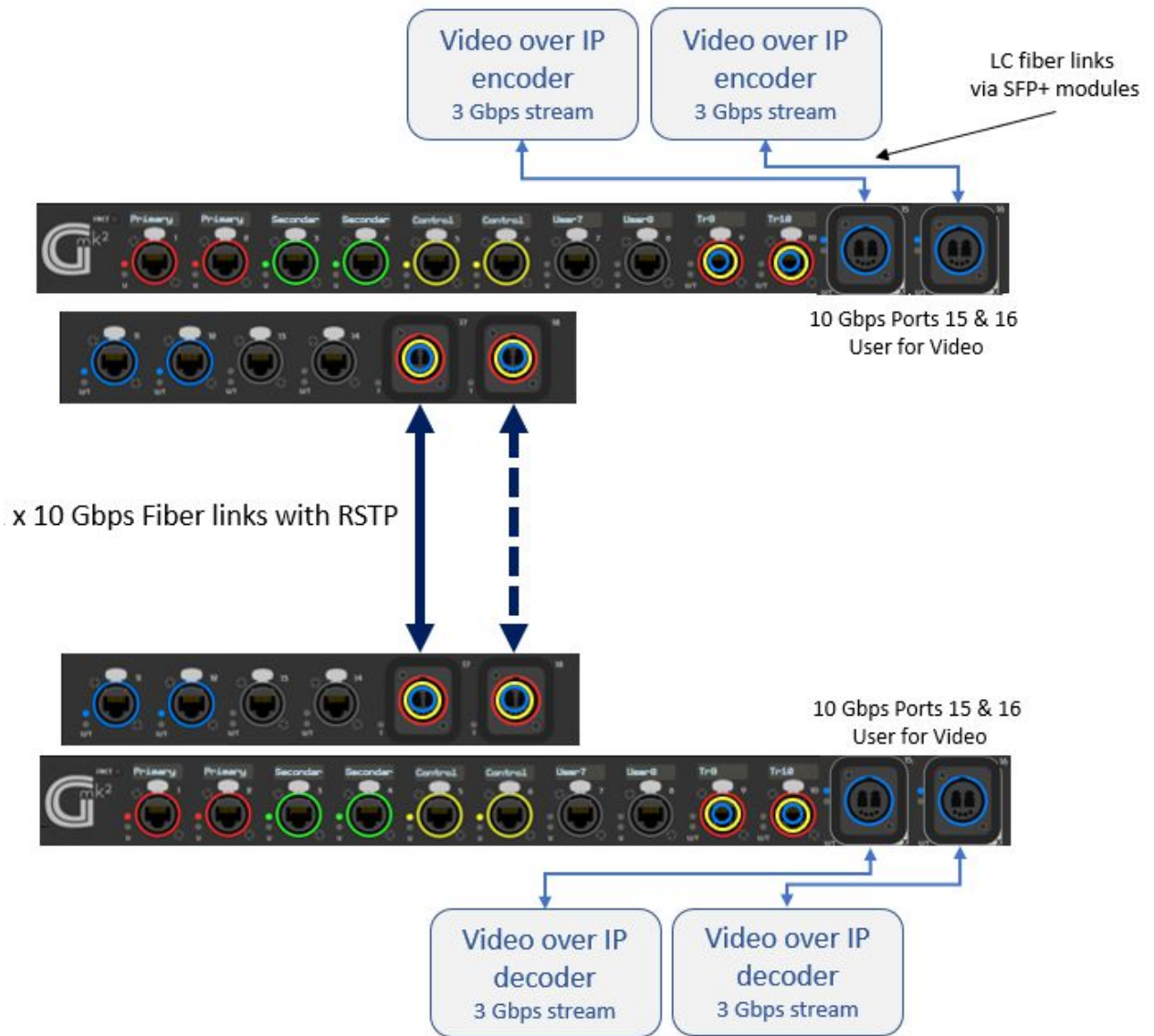


Fig.7 Example of User fiber ports for High Bitrate Video over IP streams
(i.e Dante AV, ST2110, SDVoE protocols)

Chapter 6 : Ghost Mk2 H^{DC} (optional)

H-DC is a low-level service provider integrated between the network and the end points.

Based on the last FPGA XZ7 technology H-DC node is able to provide 4 independents physical hardware clocks on four G-mk2 user ports 1 to 4.

H-DC applies Provider Backbone Bridge IEEE 802-1ah-2008 and PBB Traffic Engineering, IEEE 802.1Qay Standards and the Agora's Dual-profile Clock technology to make the bridge between local Peer-to-Peer systems and Global End-to-End requirements with an unrivalled stability.

More than a Quad boundary clocks node, with its unique place between the network and the end points H-DC is also dedicated to implement at the lowest level all the dedicated services for the most moderns AV protocols as well as adapt the legacy layers to a standardized convergent network.

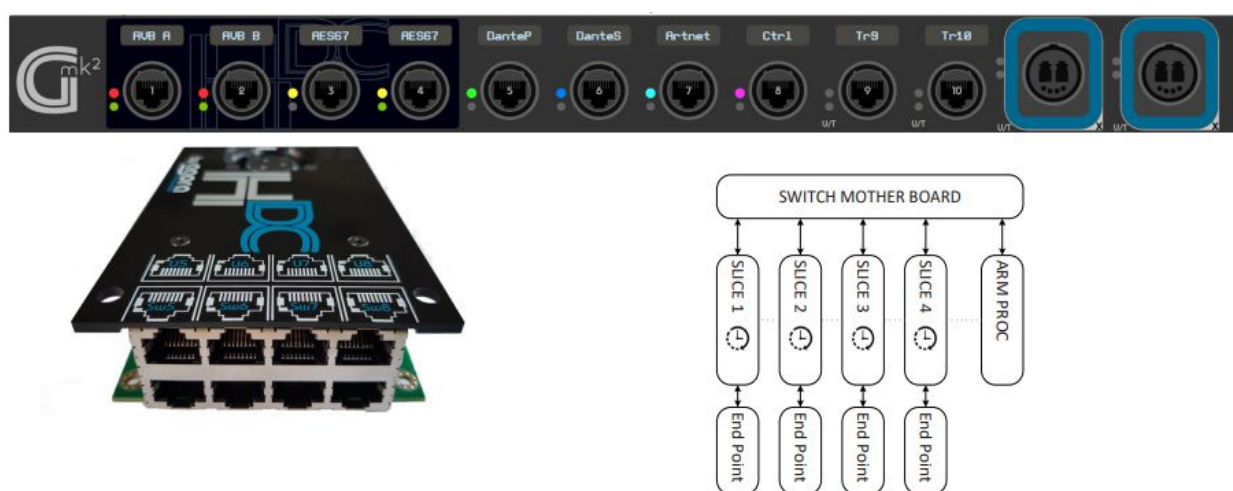


Fig.8 Ghost Mk2 + H-Dc optional card architecture

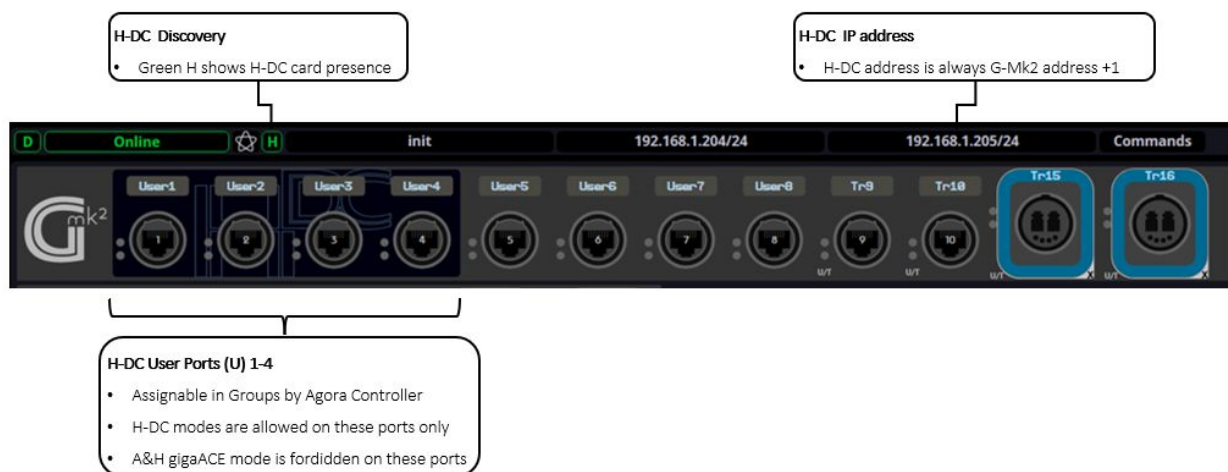


Fig.9 Ghost Mk2 in Agora Controller 2.1.X

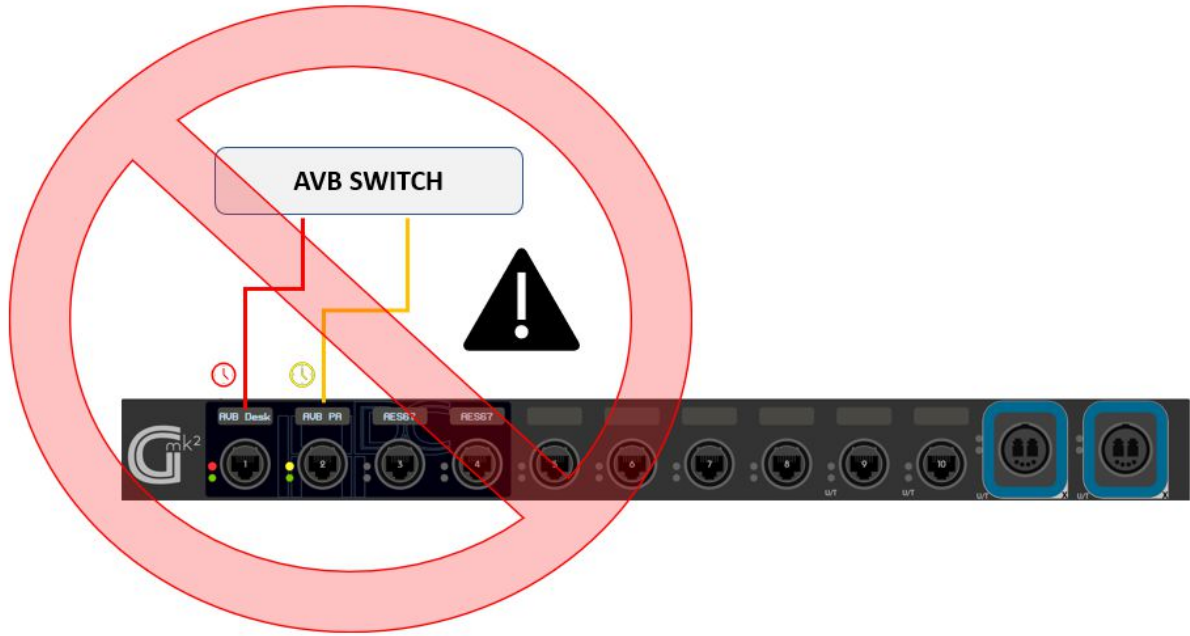


Fig.10 Switch loop caused by wrong topology.

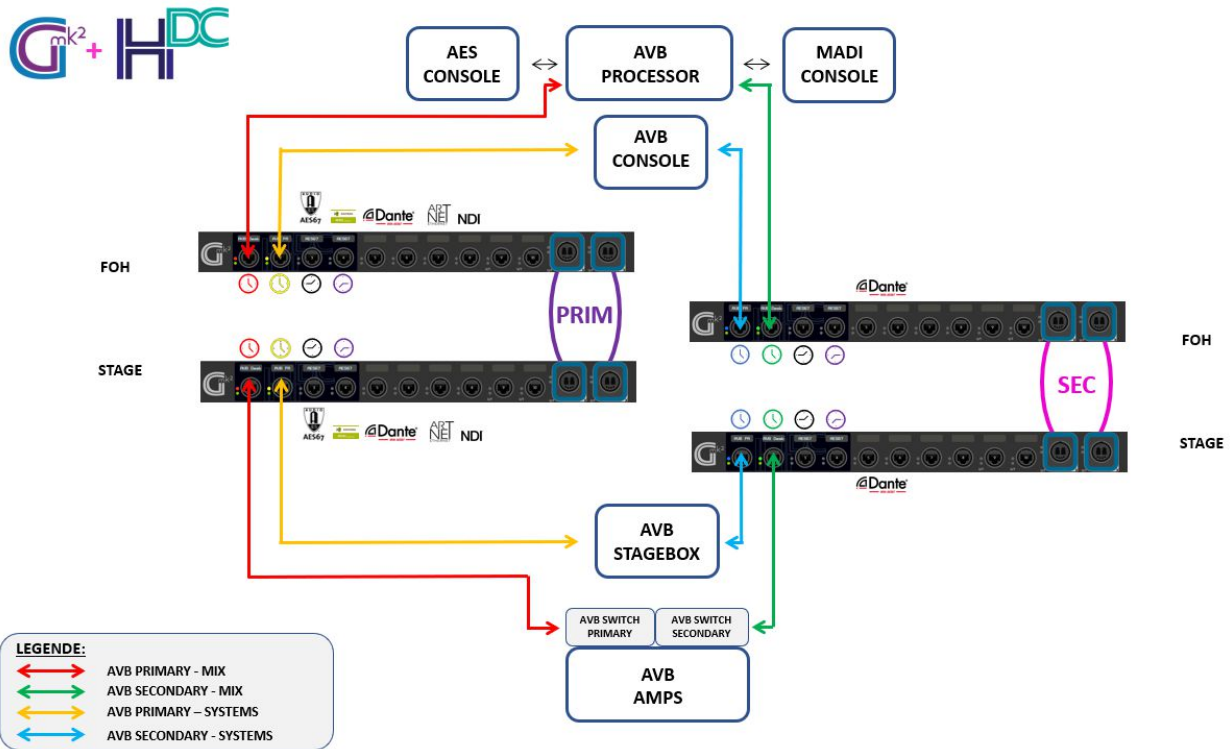


Fig.11 Example of 4 Ghost Mk2 H-DC redundant AVB application (AVB/TSN tunnel mode)

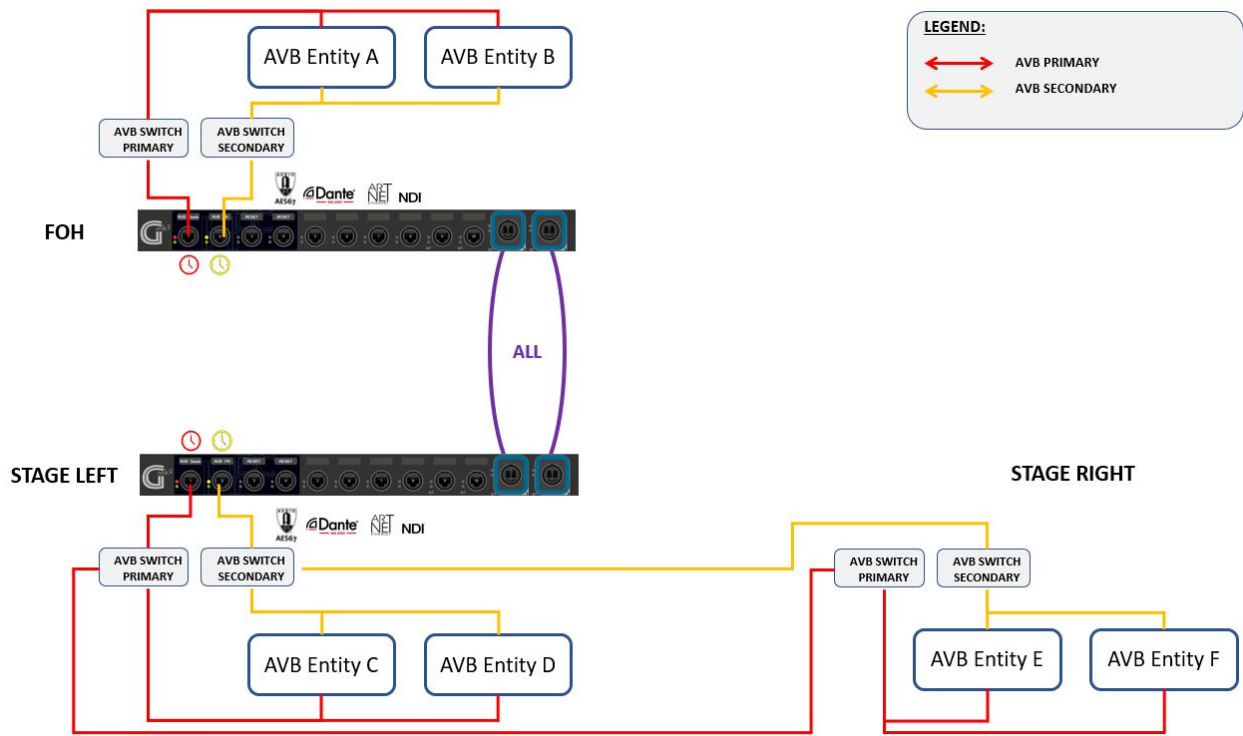


Fig.12 Example of 2 Ghost Mk2 H-DC redundant AVB application (AVB/TSN tunnel mode)

Chapter 7 : Service and maintenance information

Routine Maintenance

To help keep your Ghost Mk2 unit in good working order and to make sure it gives you optimum performance, we recommend that you carry out the following at monthly intervals:

- Clean the unit (see “Cleaning” below).
- Check the controls for freedom of operation.
- Check the functionality of all controls, that is, control knobs, pushbuttons, and LEDs.

You can carry out a visual check of all illuminated items (LEDs etc.) by switching the unit off and then on again, as they should all illuminate during power up.

- Check the functionality of the equipment.

Cleaning

Switch off the unit and electrically isolate it from the mains *before* cleaning. Clean the Ghost Mk2 device using a dry, lint-free cloth. Do not use harsh abrasives or solvents. When cleaning the unit, take great care not to damage control knobs, pushbuttons, LCDs, etc.



TECHNICAL SPECIFICATIONS

GENERAL

Size W x D x H (mm)	482.60 * 368 * 43.60
Weight (without options)	1.7 Kg
Power Consumption	100-127 VAC / 0,6 A 200-240 VAC / 0,4 A
Power supply	100/240 VAC 50/60Hz
Idle power*	19,5 W
Maximum Power rating**	26,6W
Thermal dispersion (Without options)	80.36 BTU/h (110v/60Hz)
Storage temp. / Humidity	-40° -70° / 5-90% sans condensation
Operating temp. / Humidity	0° -45° / 10-90% sans condensation
Altitude	Up to 3 km (10000ft)
Operating noise	Without FAN

CONNECTIVITY & INTERFACE

Front panel	10 x 10 Base-T / 100 Base-TX / 1000 Base-T Ethercon® 2 x 1000 or 10 000 Mbps OpticalCon® Duo ports (OPTION) 10 x 8 characters LCD screens 2 leds (Status-Traffic, ID) on each port 1 x configuration and navigation function switch
Rear panel	4 x 10 Base-T / 100 Base-TX / 1000 Base T-Ethercon® ports 2 x 1000 or 10 000 Mbps OpticalCon® Duo ports (OPTION) 2 x IEC power sockets
Software	SNMPv3 & SSH remote protocol «Emulate» Mode

PROCESSING

Mother board	1 x Marvell 98DX Data flow : up to 95,23 Mpps Switching capacity: 128 Gb/s
Network	250 x Groups available 16000 MAC Address capacity IEEE 802.1p traffic priority

PACKAGE AND WARRANTY

Package includes	1 x Ghost-mk2 engine 2 x Power cord IEC13 Lock
Warranty	5 years parts and service

* Idle power is the actual power consumption of the device with no ports connected.

** Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.

Pictures and features are not contractual. Product specifications can be modified without prior notification.

TECHNICAL SPECIFICATIONS

GENERAL

Core	1 * Xilinx Zinq 7000 FPGA including 1 * ARM Dual 32 bits
Embedded softwares	Linux PtP-4L Agora Herdre proprietary service software Agora VHDL proprietary source code
PLL's	4 * hardware VCXO clocks generators
Number of ports	4 * Gigabit ethernet ports (RGMII) 4 * Hybrid GbE / LI-TDM ports 1 * Gigabit control port directly connected to the ARM
Number of independant slices	4 slices of 1 GbE + 1 Hybrid port
Control software	SNMPv3 & SSH & UDP protocols for up to 200 devices connected Agora controller is the dedicated software for controlling H-DC modules

PACKAGE AND WARRANTY

Package includes	1 * H-DC card 1 * Internal cable set
Warranty & Support	Hardware & support - 5 Years