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ARCHITECTURAL AND ENGINEERING SPECIFICATION
PRODUCT: UCX-4X3-TPN-TX30

FUNCTIONAL OVERVIEW

The device is a compact USB-C and HDMI transmitter switcher designed for integration into BYOM environments. It provides seamless video, audio, USB2.0, and control signal extension over a single CAT6A cable, up to 100 meters using Lightware's TPN (SDVoE-based) technology. The matrix transmitter supports four selectable local inputs: two USB-C and two HDMI, with either automatic or manual input switching. Configuration and monitoring is possible through the Web GUI - the Lightware Device Controller (LDC)*, via the Lightware Advanced Room Automation (LARA) or with the Lightware Advanced Room Automation Wizard (LARA Wizard).

*(LDC is available built in, or in a desktop version)

VIDEO INPUT AND OUTPUT SPECIFICATIONS

- Input/Output port types
  - Two HDMI 2.0 and two USB-C (DisplayPort Alternate Mode) input ports and one TPN extender port (with 10G bandwidth), and two HDMI 2.0 output ports
  - One virtual input for custom image file (jpg or bmp) uploading, and using this file later as a selectable welcome screen source. The maximum image size is 4MB, the preferred resolution is 1280x720
- Maximum video performance (frame/system):
  - Uncompressed HDMI 2.0-class switching up to 18 Gbit/s (600 MHz pixel clock)
  - Up to 4K@60Hz, 4:4:4, as well as 5K@30Hz
  - Zero frame delay switching architecture ("no signal latency with zero frame delay")
  - Independent switching of its own four video input signals, or any additional hosts connected on the receiver input side
- Standards / content support (as stated):
  - Video content and all standard resolutions and frequencies as specified under HDMI up to 1920x1200 50/60Hz, or 4096x2160 60Hz (UHD, 4K)
  - 3840x2160 resolution is supported with a default Lightware EDID
  - EDID management for customizable EDID tables
  - Ability to import and export EDID and preset files from/to a PC, and store at least 100 EDID resolutions

- Users can create custom EDID resolutions
- HDCP 1.4 and 2.2 content protection standards and provided per-port HDCP authentication diagnostics via the Web GUI (LDC) or via the LW3 protocol
- HDCP can be enabled or disabled on both HDMI and USB-C inputs and provide real-time status indicators for each HDCP handshake
- 120Hz 3D video signal
- Dolby TrueHD and DTS-HD Master Audio (noted as supported)

- Signal integrity features:
  - Pixel Accurate Reclocking technology to restore signal integrity, by eliminating jitter and preserving original timing and color data.
  - Frame Detector and signal analysis (timing, HDCP, color space/range, audio presence, etc.)

AUDIO CAPABILITIES

- Independent audio layer: audio routing is independent from video routing (separate audio crosspoint)
- Digital audio sources (copied to audio layer):
  - Embedded HDMI audio
- Audio de-embedding:
  - De-embedding from incoming AV streams to the audio layer
- Analog audio
  - 5-pole Phoenix port
  - Balanced analog audio output port for stereo audio de-embedding from any of the active video sources
  - Adjustable volume, balance

USB-C / USB / HOST SWITCHING

- USB-C port
  - Full high-speed USB2.0 USB connectivity to the devices connected to the two local USB-A and two USB-C ports of the matrix and the remote USB-A ports of the receiver
  - Ability to power the connected device with 100W and another with up to 90W (if Power over Ethernet is disabled)
  - Ethernet connectivity to the internal processor (to control the matrix transmitter) to the receiver Ethernet ports, and to the local Ethernet connectors (RJ45) via the internal switch
- Flexible assignment of USB peripherals to the active host, with support for both

automatic and manual switching modes. Host switching shall not interrupt USB data transmission, and the system shall ensure full compatibility with standard USB bulk transfer protocols

- Four high-speed USB ports for connected devices (like USB camera, mic, speaker, keyboard, mouse, solid state drive) with output power of at least 1A each
- Switching of these USB devices to any of its own two host devices, or any additional inputs on the receiver side via USB-C and USB-B ports

POWERING

- Delivery of up to 30W of remote power to connected devices on the Ethernet 3 port via Power over Ethernet Plus (PoE+, IEEE 802.3at) over a single Cat6A cable
- Can be powered by an external 220W power supply
  - IEC C14 mains inlet
  - Operates from 100–240 VAC at 50/60 Hz

ETHERNET

- Integrated Gigabit Ethernet Switch
- Three RJ45-type Ethernet connectors (up to 1 Gbps speed)

SECURITY

- Network security
  - Supports basic network security measures including disabling Ethernet ports, disabling network services, enabling authentication, and using encryption via HTTPS/WSS
  - Remote service port disablement to reduce exposed attack surfaces
  - HTTP/HTTPS services provided on TCP ports 80 (HTTP) and 443 (HTTPS); HTTP is disabled by default
  - Supports encryption via HTTPS (and WSS); device generates a self-signed certificate (new certificate generated after hostname change or factory defaults); certificates signed by a CA can be uploaded
  - Supports 802.1x authentication using EAP-TLS (requires Identity, CA and Client certificates, Client Private Key, and key password)
  - Supports port-based VLAN / network separation presets (Transparent, Dedicated, Separated BYOD) and a Management network (VLAN ID 1000 reserved)
- Password handling
  - Basic authentication is enabled by default

  - Factory default password is unique, random-generated per device and provided on the device label/QR code; restored after factory defaults
  - Username is fixed: admin
  - Password requirements: minimum 10 characters; UTF-8 characters allowed; password cannot be queried; old password required to change password
  - From firmware v1.8.0: password history enforced (last 10 passwords cannot be reused)
  - Failed login protection: after 5 wrong attempts, login is denied for 15 minutes
- Ability to update the firmware of its connecting receiver device
- Support for secure REST API access with username and password authentication
- Allowing selective USB port 5V power control for security and reset functions
- Negotiation of USB port roles via USB-C Power Delivery protocol to prevent unauthorized device connections
- Requires a multi-step procedure for factory reset to avoid unauthorized erasure
- Physical security (front panel buttons)
- Front panel control lock available to disable/enable front panel buttons via button combination; locked state indicated by LED blinking behavior
- Control lock can also be set via software (including a “force locked” mode that cannot be unlocked by button combination)

CONTROL

- Support for Lightware Advanced Room Automation (LARA), a built-in room automation tool enabling event-based control without the need for external processors
- Includes an integrated crosspoint routing engine, capable of independently switching video, audio, USB, and control signals between multiple inputs and outputs
- Ability to process the occupancy sensor input port from the receiver
- Provide one bi-directional RS-232 and at least six GPIO connections as well as Ethernet and USB ports for control
- Ability to send predefined TCP commands to attached compatible devices
- Ability to recognize predefined incoming RS232/TCP commands as a condition and execute switching, sending RS232/TCP or CEC command sequences on reception
- Ability to recognize input video signal changes as a condition and execute switching, and send RS232/TCP or CEC command sequences on change
- Provide one USB-A and one USB mini-B port for service functions
- Provide front panel LED indicators for power status / video signal presence / Ethernet link activity, and physical buttons for source selection. Rear panel

indicators shall include Ethernet link activity and TPN connection status

- Support for Consumer Electronics Control (CEC) functionality over all HDMI outputs, including via the TPN extension link to connected receivers
- Allow CEC commands to be sent manually or automatically based on signal presence, USB connection, or mode change
- Support for bulk device configuration and management through the LDC software. This capability shall enable managing multiple UCX-TPN series devices concurrently, ensuring consistent configuration across rooms, zones, or entire deployments
- Support for a secure and documented REST API for integration with third-party control and automation systems. The API shall use JSON over HTTPS to provide IP-based access for configuration and real-time control of key system functions
- Provide access to a Web GUI (LDC), allowing configuration of event conditions and actions without programming skills, while also supporting custom JavaScript coding for advanced control requirements
- Provide a browser-based Touch Panel interface for the users to access room control function

GENERAL

- Compatible with the following TPN receivers:
  - HDMI-TPN-RX107
  - HDMI-TPN-RX107-V2
  - HDMI-TPN-RX107D
  - HDMI-TPN-RX107D-SR
  - HDMI-TPN-RX107A-SR
  - HDMI-TPN-RX107AU2K
  - HDMI-TPX-RX107AU2K-SR
  - HDMI-TPX-RX107DU2K-SR
- Packaged together with the following equipment:
  - 24V power adaptor with IEC power cable
  - Phoenix® Combicon 3-pole male Connector
  - Phoenix® Combicon 5-pole Connector
  - Phoenix® Combicon 8-pole Connector
  - Safety and Warranty Info, Quick Start Guide
  - Type C (USB-C) to Type C (USB-C) Cable, 1m
  - 2 pcs. of M3x4 flat head screw
- Dimensions / enclosure:

  - Compact metal enclosure
  - 271 mm (W) x 140.3 mm (D) x 26 mm (H)
  - Material: 1 mm steel
  - Weight: 1050 g
- Mounting options:
  - Mountable under tables or inside furniture (the UD Mounting Plate kits are sold separately)
  - Mountable in racks (1U rack shelves are sold separately)
  - Ventilation clearance required; do not block vents/fans
- Compliance / electrical safety (LVD-related):
  - Electrical safety standard: EN 62368-1:2024
  - Compliance: CE, UKCA, FCC Class A
  - RoHS: EN 63000:2018
- Cooling:
  - Fan cooler, which is adjusted based on the device temperature
- Warranty period: 3 years
- The product has full paper / green packaging

DOCUMENT REVISION HISTORY

Document	Release Date	Changes	Checked by
Rev. 1.0	2026-11-04	Initial version	Nikolett Keindl