STARMAX

MP-200

Dual Channel HDMI to H.264 IP Streaming Encoder
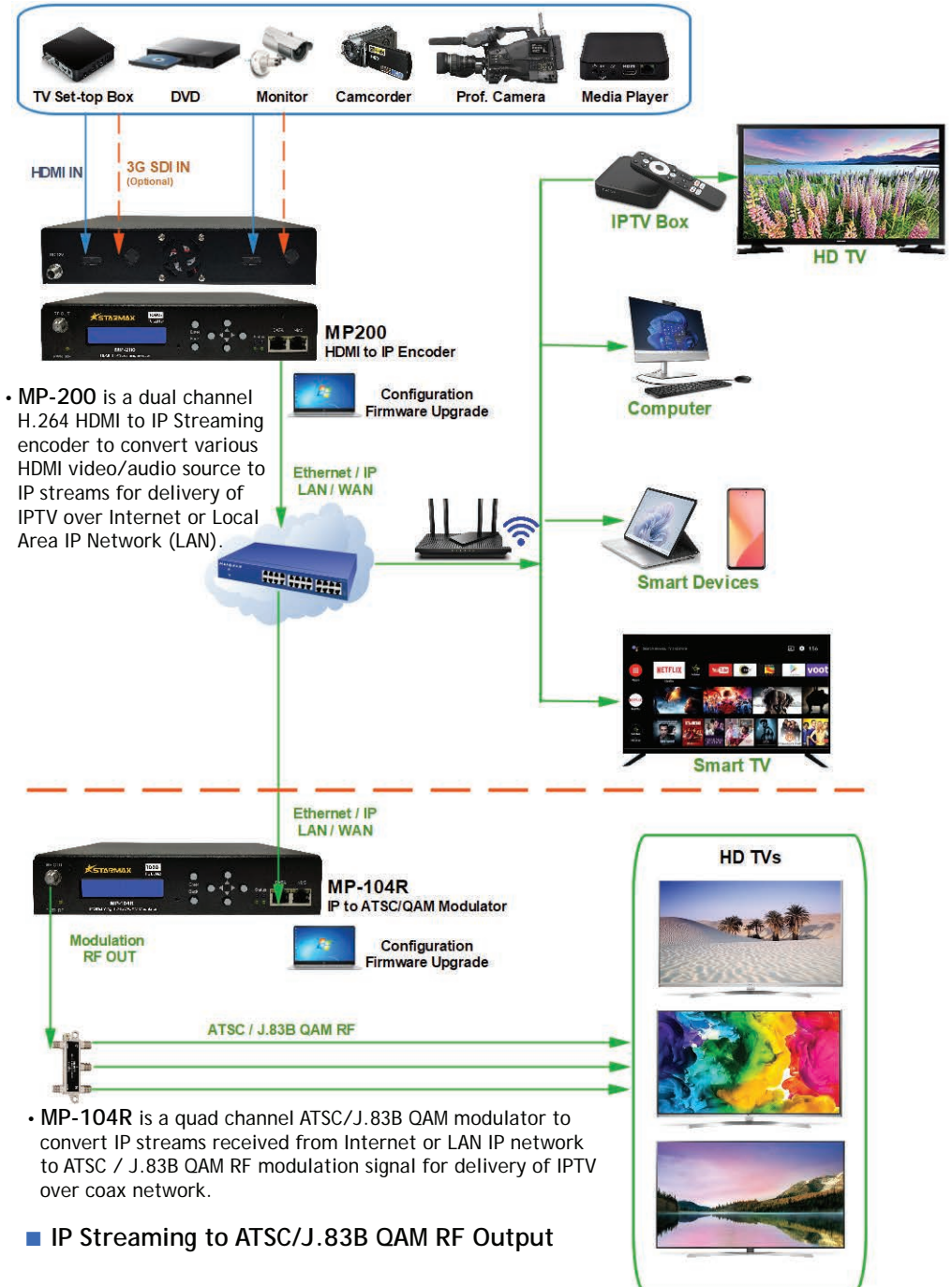

1080P FULLHD **HDMI** **H.264** MPEG-4/AVC

User Guide

v1.2
July, 2024

support@starlink7.com

Introduction

■ Various HDMI Input Source for IP Streaming Output

TV Set-top Box   DVD   Monitor   Camcorder   Prof. Camera   Media Player

HDMI IN   3G SDI IN (Optional)

MP200
HDMI to IP Encoder

Configuration
Firmware Upgrade

Ethernet / IP
LAN / WAN

IPTV Box

HD TV

Computer

Smart Devices

Smart TV

• **MP-200** is a dual channel H.264 HDMI to IP Streaming encoder to convert various HDMI video/audio source to IP streams for delivery of IPTV over Internet or Local Area IP Network (LAN).

Ethernet / IP
LAN / WAN

MP-104R
IP to ATSC/QAM Modulator

Configuration
Firmware Upgrade

Modulation
RF OUT

ATSC / J.83B QAM RF

HD TVs

• **MP-104R** is a quad channel ATSC/J.83B QAM modulator to convert IP streams received from Internet or LAN IP network to ATSC / J.83B QAM RF modulation signal for delivery of IPTV over coax network.

■ IP Streaming to ATSC/J.83B QAM RF Output

Overview
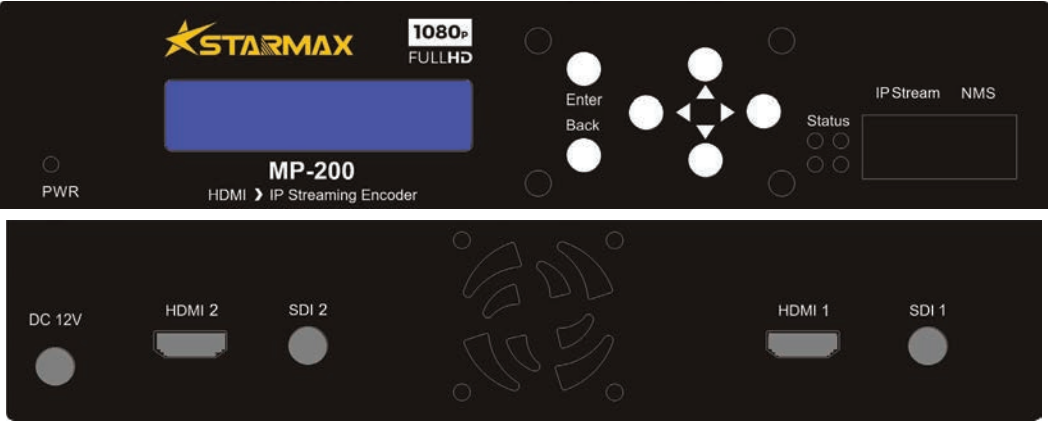
■ Operation Panel (Front)
- 3"x1.2" dot matrix LCD
- Keypad
  - **Back**   Return or escape to upper level menu and cancel the current operation
  - **◄ ► ▲ ▼**   Arrow keys to traverse between menu items or increase / decrease selected parameter value
  - **Enter**   Confirm the selection
- **DATA**   1000Base-T IP streaming output
- **NMS**   1000Base-T Web based configuration
-

  - LED 1/3 solid blue   IP streaming on-air
  - LED 2/4 solid green   HDMI connected with Transport Stream input
  -          blinking green HDMI not connected or no Transport Stream input

■ Input Interface (Back)
- **HDMI 1/2**   HDMI Input
- **SDI 1/2**   (Optional) 3G-SDI input
- **HDMI IN**   HDMI Input
- **DC 12V**   DC Power Input
- **1000Base-T**   Gigabit Ethernet, RJ-45

■ Installation Requirement
- Available video/audio source from HDMI output device
- Available Ethernet/IP network
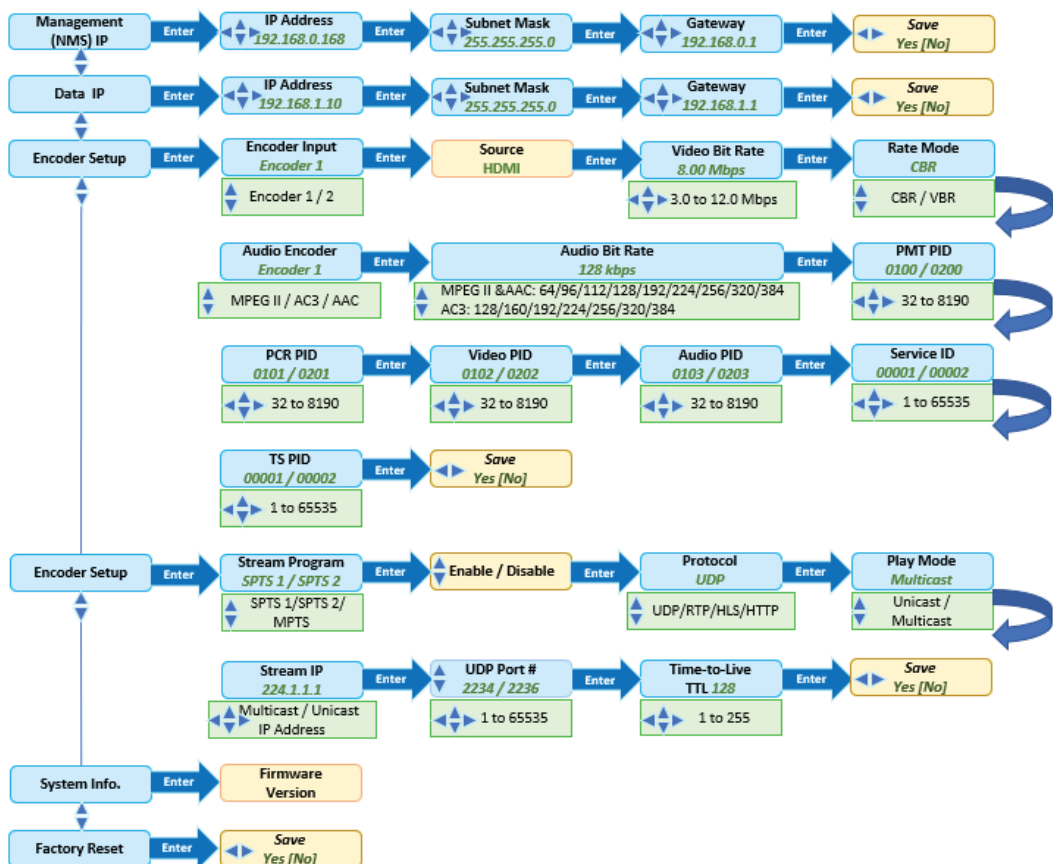- Available electrical power socket

■ Package Content
- MP-200 dual channel HDMI to H.264 IP streaming encoder
- AC/DC power adapter
- User Guide

LCD Menu Flowchart

Management (NMS) IP → Enter → **IP Address** *192.168.0.168* → Enter → **Subnet Mask** *255.255.255.0* → Enter → **Gateway** *192.168.0.1* → Enter → **Save** *Yes [No]*

Data IP → Enter → **IP Address** *192.168.1.10* → Enter → **Subnet Mask** *255.255.255.0* → Enter → **Gateway** *192.168.1.1* → Enter → **Save** *Yes [No]*

Encoder Setup → Enter → **Encoder Input** *Encoder 1* / Encoder 1 / 2 → Enter → **Source** HDMI → Enter → **Video Bit Rate** *8.00 Mbps* / 3.0 to 12.0 Mbps → Enter → **Rate Mode** *CBR* / CBR / VBR

Audio Encoder *Encoder 1* / MPEG II / AC3 / AAC → Enter → **Audio Bit Rate** *128 kbps* / MPEG II &AAC: 64/96/112/128/192/224/256/320/384 AC3: 128/160/192/224/256/320/384 → Enter → **PMT PID** *0100 / 0200* / 32 to 8190

PCR PID *0101 / 0201* / 32 to 8190 → Enter → **Video PID** *0102 / 0202* / 32 to 8190 → Enter → **Audio PID** *0103 / 0203* / 32 to 8190 → Enter → **Service ID** *00001 / 00002* / 1 to 65535

TS PID *00001 / 00002* / 1 to 65535 → Enter → **Save** *Yes [No]*

Encoder Setup → Enter → **Stream Program** *SPTS 1 / SPTS 2* / SPTS 1/SPTS 2/ MPTS → Enter → **Enable / Disable** → Enter → **Protocol** *UDP* / UDP/RTP/HLS/HTTP → Enter → **Play Mode** *Multicast* / Unicast / Multicast

Stream IP *224.1.1.1* / Multicast / Unicast IP Address → Enter → **UDP Port #** *2234 / 2236* / 1 to 65535 → Enter → **Time-to-Live** TTL *128* / 1 to 255 → Enter → **Save** *Yes [No]*

System Info. → Enter → **Firmware Version**

Factory Reset → Enter → **Save** *Yes [No]*

All commands and settings are also available on Web based configuration by connecting the Ethernet port of computers to the **NMS** port of MP-200. Launch any Web browser and point the URL to http://192.168.0.168 to login with

User name	*admin*
Password	*0000*

to access configuration pages.

Specifications

HDMI to IP Streaming Encoder		
Input	Interface	HDMI x 2, Optional 3G-SDI BNC x 2
Output	Interface	1000Base-T RJ-45 x 1 for IP streaming Unicast / Multicast UDP / RTP or Unicast HTTP / HLS (m3u8)
	Transport Streams	SPTS x 4 or MPTS x 1
H.264 Video Encoding	Format	H.264 AVC / HP @ L4.0
	Resolution	Input 1080 50/60 p/i, 720 50/60p, 576i, 480i
		Output: up to 1080 30p
	Bit Rate	Input: 3 to 12 Mbps
	Rate Control	Constant Bit Rate (CBR), Variable Bit Rate (VBR)
	Chroma Sampling	4:2:0, 4:2:2
	Profile	High, Main
	Level	3.0, 3.1, 3.2, 4.0, 4.1, 4.2
	GoP Structure	IBP, IPPP
Audio Encoding	Format	MPEG-1 Layer 2, AAC, AC3
	Sampling Rate	44.1 kHz, 48.0 kHz
	Bit Rate	64 to 384 kbps
General		
Management/Configuration		1000Base-T RJ-45 x 1 Web based
Power Supply		12 VDC, 1A
Dimensions		8.66" x 8.11" x 1.73" (220 x 206 x 44 mm)
Weight		2.2 lbs (1000g)
Environment		Operating Temperature: 5 to 40 °C Humidity: 80% @ 30 °C

■ IP Streaming Scenario

IP streaming to smart devices (TVs, phones, tablets, computers) requires the IPTV streams generated from encoder/sender/server to reach the decoder/receiver/client over the IP network. The IPTV streams are distributed over WAN/Internet or LAN/Intranet through wired or wireless (e.g. Wi-Fi or cellular) connection on demand basis.

The Internet/Intranet connection bandwidth required for live IPTV streaming is about 9Mbps per channel for 1080p video resolution. Larger streaming server such as YouTube, AWS, Hulu offer higher throughput or bandwidth to deliver the live streaming to millions of users simultaneously.

The output of MP-200 IP streams can be received and played on various smart devices, such as
• Regular TV with Android TV set-top box, IPTV set-top box, or IPTV to HDMI decoder
• Android Smart TV
• Computer, cell phone, tablet
• MP-104R IP to ATSC / J.83B QAM RF modulator for distribution of IPTV over coax network

Video or Media Player App, such as VLC (www.videolan.org), MX player (www.mxplayer.in) from Google Play or Apple store, is required to support Network Streaming in order to play IPTV streams on computer, smart TVs or other smart devices.

Refer to the section Playlist URL for more information about IP streaming protocols and playlist context.

Web Configuration and Remote Control

① Connect the Ethernet (RJ-45) port marked NMS on the front panel of MP-200 to the Ethernet port of a PC with Ethernet cable. Power on MP-200.

② Configure the IP address of the PC to be static IPv4 192.168.0.100.

③ Launch a Web browser on PC and type http://192.168.0.168, The default login name is '*admin*' and the default password is '*0000*'.

The default IP address of MP-201 NMS port is 192.168.0.168. If this address is changed from LCD menu or Web configuration page, write down the new IP address for future use. If the IP address of the NMS port of MP-200 is unknown, press and hold the reset button for 5 seconds to restore the default IP address of NMS port to be 192.168.0.168.

■ Login

The default login name is '*admin*' and   the default password is '*0000*'.

There are 3 sections on Web configuration pages - Summary, Encoder, and System.
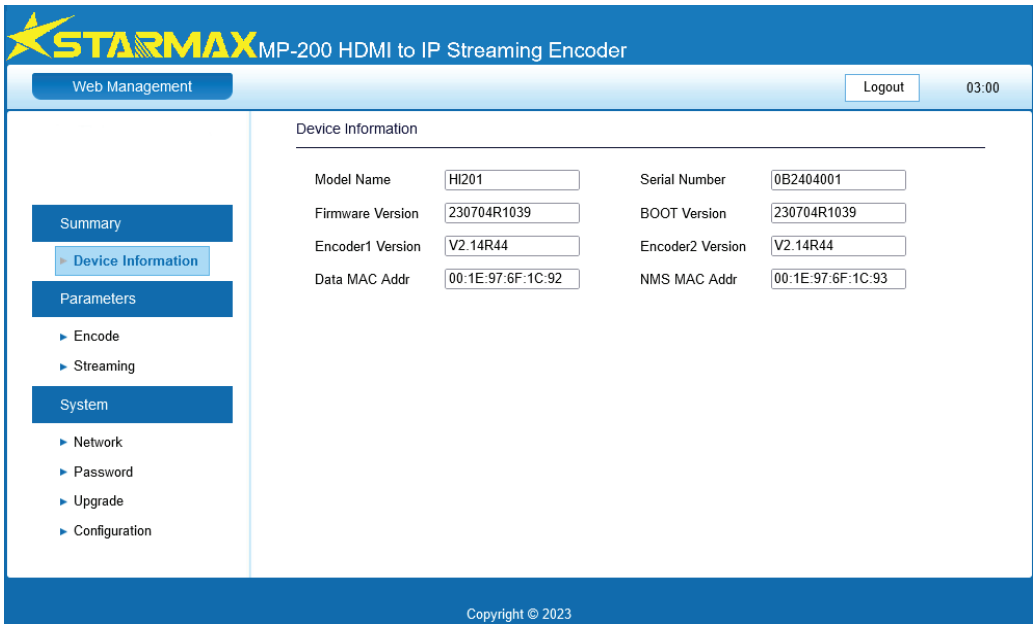
Web Configuration - System

■ Network

NMS IP   IP settings of Configuration (NMS) port.

IP Address	192.168.1.168
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1

Data IP   IP settings of streaming Data port.

IP Address	192.168.0.10
Subnet Mask	255.255.255.0
Default Gateway	192.168.0.1

[Cancel] [Apply]

Notes:
- IP address of NMS port and DATA port CANNOT be configured in the same subnet to avoid conflict
- Current IP addresses of NMS port and DATA port are displayed on LCD menu

■ Login User Name and Password

New Username	admin
New Password	
Confirm Password	

[Apply]

■ Upgrade

Firmware File :

[Choose] [Upgrade]

Press *Choose* button to select firmware file (*image.ub*) and then *Upgrade* button to update the firmware.

Encode File :

[Choose] [Upgrade]

Note: MP-200 reboots after Firmware/Encoder/Boot file update. Wait for 1 minute to allow the unit to boot up.

BOOT File :

[Choose] [Upgrade]

Press *Choose* button to select boot loader file (*bootloader.bin*) and then *Upgrade* button to update boot loader.

■ Configuration

Factory Reset	[Apply]	Apply Factory Reset to restore configurations to factory defaults.
Download Config	[Save]	Download configuration file from the device to PC connected.
Upload Config	[Load]	Upload configuration file from PC connected to the device.

Web Configuration - Parameters

■ Encoder Parameters

	Encode 1	Encode 2
Source	HDMI	HDMI
Video Bit Rate (Mbps)	8.00	8.00
Rate Mode	CBR	CBR
Audio Encode	MPEG	MPEG
Audio Bit Rate (Kbps)	128	128
H.264 Profile	High Profile	High Profile
H.264 Level	4.0	4.0
GOP Structure	IBP	IBP
PMT PID	100	200
PCR PID	101	201
Video PID	102	202
Audio PID	103	203
Service ID	1	2
TS ID	1	2
Service Provider	TVProvider-1	TVProvider-2
Service Name	HDTV-1	HDTV-2
Resolution	1080p30	1080p30
Bit Rate	8.01 Mbps	8.04 Mbps

Cancel   Apply

- ♦ **Video Bit Rate**   3 to 12 Mbps. For 1080p resolution (1920x1080), suggested bitrate is 4Mbps for Medium bitrate, 8Mbps for High bitrate, and 12Mbps for Ultra High bitrate.
- ♦ **Bit Rate Mode**   Selection of Constant Bit Rate (*CBR*), or Variable Bit Rate (*VBR*).
- ♦ **Audio Codec**   Selection of MPEG II, AC3, or AAC.
- ♦ **Audio Bit Rate (kbps)** Selection of 64,112, 128, 160, 192, 224, 256, 320, or 384 kbps.
- ♦ **H.264 Profile**   Selection of High or Main profile.
- ♦ **H.264 Level**   Selection of 3.0, 3.1, 3.2, 4.0, 4.1, or 4.2 level.
- ♦ **Group of Picture (GoP)** Selection of IBP frames or IPPP frames.
- ♦ **PMT PID**   Program Map Table (PMT) Packet ID (PID) between 32 and 8190.
- ♦ **PCR PID**   Program Clock Reference Packet ID (PID) between 32 and 8190.
- ♦ **Video PID**   Video Packet ID (PID) between 32 and 8190.
- ♦ **Audio PID**   Audio Packet ID (PID) between 32 and 8190.
- ♦ **Service ID**   Service Stream ID between 1 and 65535.
- ♦ **TS ID**   Transport Stream ID between 1 and 65535
- ♦ **Service Provider**   Service Provider name. Maximum 15 characters allowed.
- ♦ **Service Name**   Service name. Maximum 15 characters allowed.

Web Configuration - IP Streams

■ IP Streams

Stream	Output	Protocol	Play Mode	IP / File	Port	TTL
SPTS 1	ON ∨	RTP ∨	Multicast ∨	224.1.1.1	2234	128
SPTS 2	ON ∨	UDP ∨	Multicast ∨	224.1.1.1	2236	128
MPTS	OFF ∨	UDP ∨	Multicast ∨	225.2.2.2	2242	128

Cancel   Apply

IP video streams can be distributed in Single Program Transport Stream (SPTS) or Multi-Program Transport Stream (MPTS). Each type of stream can be delivered in Unicast address or Multicast address to reach destination over IP network.

Multicast IP address range is 224.0.0.0 to 239.255.255.255 with 224.0.0.0 to 224.0.0.255 reserved exclusively for local network management and maintenance. If Multicast address is used to reach the destination for a video player APP to receive and play the IP streams,

① Both the encoder/sender and the decoder/receiver of IP streams are located in the same Local Area Network (LAN) subnet.
② Both the encoder/sender and the decoder/receiver of IP streams join the same multicast group.
③ The network administrator has configured the routers and firewalls in the LAN to allow Multicast traffic to pass through without blocking.

Input from each HDMI interface can be encoded to one SPTS stream. Inputs from both HDMI interfaces can be encoded to one MPTS stream.

- ♦ Streams   SPTS 1   The 1st output SPTS from HDMI 1 source.
  SPTS 2   The 2nd output SPTS from HDMI 2 source.
  MPTS   The output MPTS from both HDMI 1 and HDMI 2 source.
- ♦ Output   Selection of ON/OFF to enable/disable IP stream output.
- ♦ Protocol   Selection of UDP, RTP, HLS or HTTP as IP streaming protocol.
- ♦ Play Mode   • UDP or RTP Protocol
  Selection of Unicast or Multicast for destination address of IP streams.
  Multicast can ONLY be used where MP-200 and the receiver/decoder are located in the same subnet.
  • HLS or HTTP Protocol
  SPTS only.
- ♦ IP / File   • UDP or RTP Protocol
  Unicast or Multicast IP address of IP streaming destination.
  • HLS or HTTP Protocol
  IP stream URL for decoder/receiver to identify and access.
- ♦ Port   UDP port number of IP streaming destination (for UDP or RTP only).
- ♦ TTL   Time-To-Live (TTL) value of IP streaming packets between 1 and 255.

Playlist URL

■ UDP and RTP

♦ Unicast   udp://@*destination_IP_address*:*port_number or*
rtp://@*destination_IP_address*:*port_number*
for example udp://@192.168.10.25:2234 where 192.168.10.25 is the IP address
of the decoder/receiver of IP streams.

♦ Multicast   udp://@*multicast_IP_address*:*port_number* or
rtp://@*multicast_IP_address*:*port_number*
for example udp://@224.1.1.1:2234 where 224.1.1.1 is the multicast IP address.

■ HTTP Live Streaming (HLS)

Stream File   http://*source_IP_address*/h1.m3u8 *(*for HDMI 1 input*) or*
http://*source_IP_address*/h2.m3u8 (for HDMI 2 input)
for example http://192.168.0.10/h1.m3u8 where 192.168.0.10 is the IP address
of the DATA port of MP200 encoder that generates the IP streams.

■ HTTP

Stream File   http://*source_IP_address*:8080/h1.ts (for HDMI 1 input) *or*
http://*source_IP_address*:8080/h2.ts (for HDMI 2 input)
for example http://192.168.0.10:8080/h1.ts where 192.168.0.10 is the IP address
of the DATA port of MP200 encoder that generates the IP streams.

Compliance

■ Warranty

The MP-200 modulator has one-year Limited Hardware Warranty and 90-day free software updates after purchase. This Limited Warranty Statement gives the customer specific legal rights. The customer may also have other rights which vary from State to State in the United States, from province to province in Canada, and from country to country elsewhere in the world. To the extent that this Limited Warranty Statement shall be deemed modified to be consistent with such local law. Under such local law, certain disclaimers and limitations of this Warranty Statement may not apply to the customer.

■ Important Safety Instructions

Basic safety precautions should always be followed to reduce the risk of fire, electrical shock, and personal injury, including the following:
• Do not use this product near water – for example, near a bathtub, kitchen sink, laundry tub, or swimming pool, or in a wet basement; only clean with dry cloth.
• Do not block any ventilation openings. Install in accordance with the manufacturer's instructions. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus including amplifiers that produce heat.
• Do not remove the cover of the modulator, cover the modulator with thick or heavy objects.
• Use only the power cord indicated in this manual if applicable.

■ FCC Class B Equipment

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by implementing one or more of the following measures:
• Reorient or relocate the device
• Increase the separation between the device and receiver
• Connect the device to an outlet on a circuit different from that to which the receiver is connected (applicable only to power line products)
• Consult the dealer or an experience radio or television technician for help

■ Declaration of Conformity for Products Marked with the FCC logo – USA Only

This device complies with Part 15 of the FCC Rules license-exempt RSS standard(s). Operation is subject to the following two conditions:
• This device may not cause harmful interference
• This device must accept any interference received, including interference that may cause undesired operation of the device
Where applicable standard FCC Part 15, Subpart B ANSI C63.4:2014, the BSL Testing Co., Ltd. performed above specification conformity test and issued certificate # BSL24030234P01-E01 in accordance with local regulation.

■ Declaration of CE and RoHS Conformity

Objects: MP-200 and MP-104R
This declaration of conformity is issued under the sole responsibility of the manufacturer for products of HDMI IP encoders that support single channel or multi-channel IP streaming standards. The object(s) of the declaration described above are in conformity with the relevant Community harmonization legislation:
– Harmonized Directive with RoHS Directive (2015/863/EU) and 2017/2012/EU amending Annex II to 2011/65/EU
– Electromagnetic Compatibility Directive (2014/30/EU)
- LVD Directive (2014/35/EU)
And their amendments.
References to the relevant harmonized standards, including the date of the standard, used in
relation to which the conformity is declared:
– ETSI EN 55032:2015+A11:2020
- ESTI EN 62368-1:2020+A11:2020
- ESTI EN 55035:2017+A11:2020
- ESTI EN IEC 61000-3-2:2019+A1:2021
- ESTI EN IEC 61000-3-3:203/A2:2021
- EN IEC 62321-1:2013, 62321-4:2013/AMD1:2017, 62321-6:2015, 62321-7-2:2017, 62321-3-1:2013
            62321-5:2013, 62321-7-1:2015, 62321-8:2017
Where applicable, the TMC Testing Service Co., Ltd. performed above specification conformity test and issued certificate # MK24030234P01-S01, MK24030234P01-C01, and MK24030234P01-E01 in accordance with local regulation.

Trouble Shooting

♦ **The NMS port is not accessible for configuration of MP-200 encoder**
  • Make sure the IP address of the NMS port of MP-200 is entered to the Web browser correctly. The IP address of the NMS port can be displayed on LCD screen by traversing the menu tree.
  • The IP address of the LAN port of computer connects to the MP-200 is assigned with different IP subnet from the NMS port of MP-200.

♦ **Why the NMS and the DATA ports of MP-200 cannot be assigned to the same IP subnet**
  If IP addresses of the NMS port and the DATA port of MP-200 are assigned to the same subnet, the internal Ethernet switch may transmit the IP streams to the wrong port to forward.

♦ **Does MP-200 support DHCP**
  MP-200 doesn't support DHCP. Static IP addresses have to be assigned to the NMS and the DATA ports of MP-200. It's common to connect the DATA port to the router of home network or LAN to deliver IP streams through Internet or Intranet for broader audience, but make sure the static IP address assigned to the DATA port doesn't duplicate the IP address assigned to other computing devices connected to the same network to avoid IP address conflict.

♦ **Where to find good media player App to play IP streams**
  For Smart or Android TV, media player Apps can be found on Google Play Store or Apple Store. The media player App is required to include the feature of receiving network streams. VLC player from www.videolan.org can be a good choice because it's a free and open source cross-platform multimedia player and framework that plays most multimedia files as well as DVDs, CDs, VCDs, and and various streaming protocols.

♦ **Which protocol is better to be used for IP streams to reach the media player**
  Either Unicast or Multicast UDP or RTP streaming protocol is recommended. Refer to the section Playlist URL for more information.
  Secure Reliable Transport (SRT) and Network Device Interface (NDI) protocols are not supported.

♦ **What's the Ethernet network bandwidth required for IP streaming**
  Depending on the video bit rate configured on MP-200, minimum 12 Mbps of network bandwidth per channel is required. Lower network bandwidth will cause high latency and jitter of IP stream playback.

♦ **What's the internal memory required for better buffering of IP stream playback**
  Minimum 8G bytes of free memory is recommended for smart TV, TV box, computer or smart device to avoid video/audio cut off.

♦ **Why is IP streams not played well on smart TVs, computers or smart devices**
  • Check the Ethernet connection of the receiver/decoder and make sure the IP streams distributed by MP-200 are accessible. For example, Ping the MP200 and check the reply time is short enough to reach the receiver.
  • Make sure the network bandwidth between the receiver/decoder and MP200 is higher than 12 Mbps per (HDMI) channel.
  • Configure MP-200 to use UDP/RTP Unicast or Multicast protocol to transmit IP streams and enter the valid URL playlist context on receiver/decoder to retrieve IP streams.
  • If UDP/RTP Multicast protocol is configured on MP-200 to transmit IP streams, make sure the Ethernet/IP router(s) and firewall are not blocking the Multicast traffic inside the same subnet.

♦ **How to replace RF modulators with MP-200**
  The output of MP-200 can be transmitted over Ethernet/IP network, such as Wi-Fi or wired Ethernet cable, instead of coaxial cable, to reach the destination. The receivers/decoders, such as Android TVs, TV boxes, cell phones, computers, or other smart devices, need to access the same Ethernet/IP network through Wi-Fi or Ethernet cable, to retrieve the IP streams for playback. Ethernet over coaxial (EoC) device, such as MoCA, can also be used to transmit the IP streams to reach receivers/decoders.

Notes

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

STARMAX

STARMAX is a trademark of StarLink LLC