Product Specification

West Pond Enterprises
FlexStream MX-GS200, MD-100, & RX-WP100

Multiplexer – Broadcast Network Manager & Managed Receiver

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Provided by:

WEST POND
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1   Revision History

Date	Version	By	Description
9/20/2015	V1.0	sdh	Initial release of 1.0 product specification.
9/24/2015	V1.1	sdh	Removed Appendix A. Updated functionality.
10/14/2015	V1.2	sdh	Small edits, title change to include MD-100
12/15/2015	V1.3	sdh	Corrected dimensions & product names

2   Related documentation

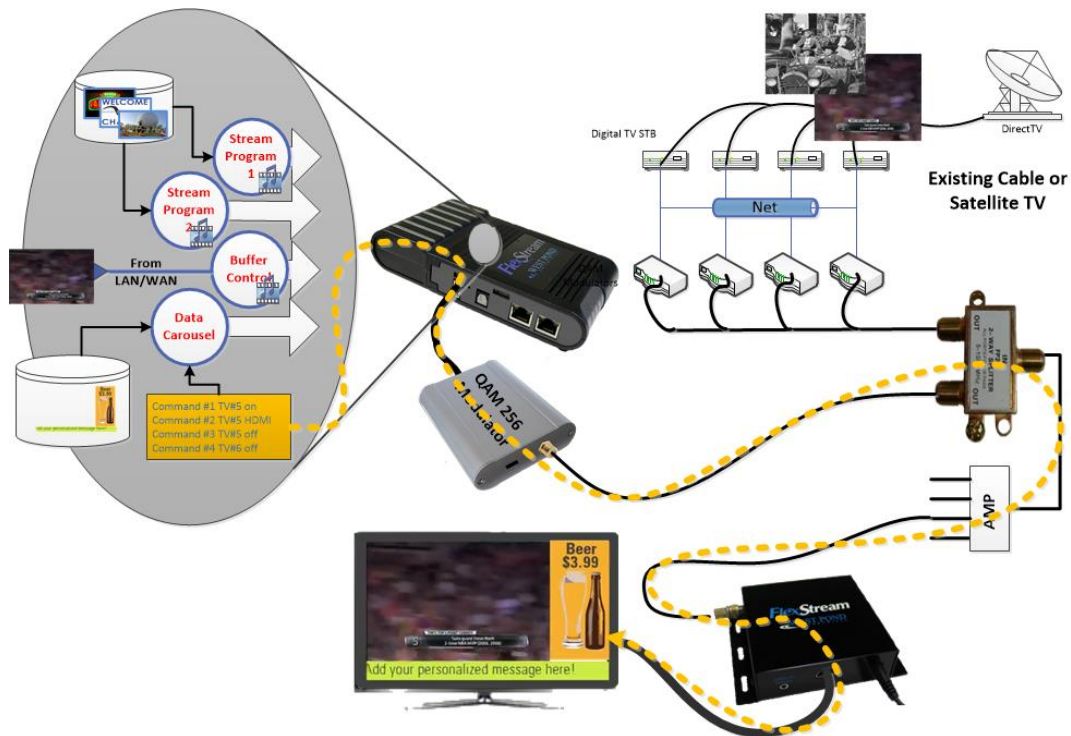| Date	Version	By	Description

Figure 1

3 Overview

The MX-GS200 combines A/V programming, digital signage data, device commands & controls, and other content onto a single Multi-program MPEG Transport Stream (MPTS) for distribution over coax or wireless networks. The input streams are either generated by the MX-GS200 streamer/data carousels or provided as an input to the MX-GS200 over the gigabit Ethernet connections. As shown in Figure 1, the output of the MX-GS200 is typically modulated onto a single carrier frequency and combined with other signals on the RF network where it is delivered to TVs, computers, the RX-WP100 digital signage receiver, and other FlexDK enabled devices. The integrated broadcast quality multiplexer ensures A/V compatibility with consumer and commercial TVs.

Broadcast transports, such as satellite, terrestrial TV, and cable TV distribute one transport stream per broadcast frequency. Devices that create transport streams typically create one audio/video (A/V) program per transport stream. A multiplexer, such as the one in the MX-GS200, can combine multiple transport streams containing one A/V program into one transport stream containing many A/V programs, thus enabling the distribution of multiple A/V programs in a single frequency. This increases the program distribution capability of the satellite, cable, or terrestrial broadcast transports.

A program stream within the MPTS can also contain one or more streams of data. Data streams can be used to deliver files to enabled receivers. The RX-WP100 receives commands, configuration, software updates, display controls, and digital signage content using a data stream. The FlexDK SDK can be integrated into TVs, computers, or other embedded devices to enable file reception and other features.

Broadcast transports, such as cable and terrestrial TV, are used distribute programming in stadiums, hotels, hospitals, houses of worship, large retail stores, apartment buildings, education facilities and commercial office space. All of these venues can take advantage of the MX-GS200 features.

The multiplexer input streams can come from a number of sources that support the MPEG2 Transport Stream as an output. This includes:

- Internal Streamer
- Internal Data carousel
- External networked commercial media players such as those from BrightSign®
- Video capture devices which capture HDMI or VGA images and convert to a transport stream. I.e. Epiphan VGA/DVI Broadcaster®
- Personal computer software such as VLC or ffmpeg
- IPTV sources and data from other Multiplexers

These streams enter multiplexer over the gigabit Ethernet ports using the UDP or UDP RTP protocols. The MPTS output can be USB or Ethernet. It can be consumed directly by LAN based computers, IPTV set top boxes, or network TVs, or delivered to TVs or traditional broadcast receivers when output to a modulator.

When using traditional broadcast receivers, the MPTS must be encoded, signaled, and modulated so as to be compatible with the receiving equipment. For example, the ATSC transport cannot exceed 19.29

mb/s, the video must be MPEG2 encoded, the audio AC3 format, and PSIP signaling must be included. The mux can be configured to be compatible with most of the common broadcast and cable transports. The input streams must be encoded properly and the sum of the data rates should not exceed the available bandwidth. When possible, the MX-GS200 will warn the user of incompatibilities.

4 Hardware

4.1 Base unit

- Form factor: Shelf top / Wall mount unit. Dimensions: 108mm (L) x 58mm (W) x 24 mm (H)
- Weight: < 9.8 kg (< 1 lb)
- Certifications: FCC class A/CE class A, UL
- Operating Temp.: 0° - 40^oC (32°-104^oF)
- Storage Temp.: -25° - 70^oC (-13°-158^oF)
- Humidity: 10 – 95% RH, non-condensing
- Input voltage: 100 - 240VAC (50-60Hz)
- Power consumption: 3A @ 5V
- Physical I/O: 2 GigE, 2 USB 2.0 Host, 1 SD, WiFi 802.11 b/g/n AP
- LEDs: Power, Status, Mux, Modulator, Ethernet Link/Act/Transfer Rate

4.2 Options

4.2.1 MD-100 USB modulator

Single frequency, frequency agile, modulation agile modulator.

- Form factor: Shelf top / Wall mount unit. Dimensions: 100 mm L X 80 mm W X 25 mm H
- Operating Temp.: 0° - 40^oC (32°-104^oF)
- Storage Temp.: -25° - 70^oC (-13°-158^oF)
- Humidity: 10 – 95% RH, non-condensing
- Input voltage: < 500mA @ 5V USB
- USB device port
- RF output
- USB powered

4.2.2 RX-WP100 Receiver / Player

Singe tuner, RF tuner, DTV receiver/ Digital Signage Player

- Form factor: Wall mount unit. Dimensions: 100 mm L X 100 mm W X 25 mm H
- Operating Temp.: 0° - 40^oC (32°-104^oF)
- Storage Temp.: -25° - 70^oC (-13°-158^oF)
- Humidity: 10 – 95% RH, non-condensing
- Input voltage: < 700mA @ 5V (AC adapter provided)
- RF input
- RS-232 display controls

5   Features

5.1   MX-GS200

The MX-GS200 provides all of the signaling, multiplexing, content streaming, and data carousels necessary to create a complete broadcast transport stream. The compact shelf-top package includes the following features:

- Dual Gigabit Ethernet ports
    - 1 LAN / 1 WAN
    - NAT firewall
- Dual USB ports
    - Update software & configure system with USB command sticks
    - MD-100 Modulator
    - Additional storage
- SD card
    - Additional storage
- Wi-Fi AP
    - Access Web UI
- 4 status indicator LEDs
    - Power
    - Mux Streams
    - Internet
    - Transmitter
- WAN and LAN
    - NAT firewall
    - Internet access to enable FlexDM (WAN)
    - Streaming inputs/outputs
    - Access Web UI
- Dimensions
    - 108mm (L) x 58mm (W) x 24 mm (H)
- TS grooming/monitoring
    - RTP and UDP format, auto detect
    - Monitors programs streams for errors and over subscriptions
    - DTV White Space signaling
    - Inserts PSIP and DVB-T tables
    - Rate smoothing
    - Time stamping
    - Corrects common A/V artifacts
- Data carousels
    - West Pond RX software updates
    - West Pond RX control channel
    - West Pond RX L-bar signage data
    - West Pond RX display control state
    - Files for FlexDK SDK enabled devices

5.2 MD-100

The MD-100 (see Figure 1) is a single frequency modulator. Sold as a companion product to the MX-GS200, the MD-100 receives its configuration and transport stream via a high speed USB 2.0 connection and outputs a modulated RF signal consisting of one MPTS. This modulator is both frequency agile (300 MHz − 900 MHz) and modulation agile. The table below shows the Transmission Standards supported.

Transmission standard	Support
ATSC − North America Terrestrial	√
QAM −B North America Cable	√
DVB-T Europe Terrestrial	√
DVB-C Cable	√
ISDB-T Japan & Latin America Terrestrial	√
ISDB-C Japan Cable	√

5.3 RX-WP100

The RX-WP100 digital signage receiver provides L-Bar style digital signage and display controls using wired (coax) or wireless broadcast transports.

- Tuner:
  - MHz boundaries, 470 - 860 MHz UHF (ATSC, US Cable, DTV-T options)
- Demodulation:
  - ATSC / US Cable: 8-VSB, QAM 64, QAM 256
  - DVB-T: QPSK, QAM 16, QAM 64
- Video decoder:
  - MPEG2 & h.264/MPEG-4 AVC high-profile decode
- Audio decoder:
  - AC-3, AAC, MP3
- HDMI output 1.3a:
  - Common formats to 1080p, 5' cable included
- Status LEDs:
  - Power, Fault, Signal, and 4 bar signal strength
- Button controls:
  - On screen display on/off
  - Channel change/Rescan
- TV control:
  - Commercial TVs: DB-9 RS-232 5' cable and null modem adapter included
  - Consumer TVs: HDMI-CEC (power on/off and input selection only)
- TS Streamer:
  - Upload and store TS files
  - Create channels and associated playlists

- Data carousel:
  - Send files to the RX-WP100 and devices enabled with the FlexDK
  - Targeting is certificate signed to prevent unauthorized data distribution
- Manageability:
  - Web UI
    - Password protected
  - Wifi AP
  - USB configuration sticks
  - FlexDM (Remove management, not currently available for customer use.)

West Pond receivers are designed to operate as the slave to a host. The Mx-WP200 can host a near infinite number of receivers. To host a receiver, simply add it to the managed receiver list.

5.3.1.1 Managed mode

In managed mode the receiver state is controlled by the FlexStream Multiplexer (aka MX-GS200). A list of all managed receivers is maintained in the multiplexer. The state of the receiver and its display are set via the multiplexer Web UI and after a short delay the receiver state reflects those settings. Managed mode is detected by the receiver during a channel scan. Channel scan occurs on initial power fail, when channel scan is manually restarted, or if channel lock is lost for an extended period of time. Once detected the scan stops and the device immediately enters managed mode.

- Detects managed mode on scan, state is persistent for fast boot
- Channel change button is disabled, others buttons disabled as configured
- State includes channel, display type, and display RS-232/HDMI-CEC controlled features
  - Power on/off, volume, input, many other commands typical to remote controls
    - Note: HDMI-CEC limited to power and input selection
  - RS-232 support for: Ciil, Samsung, & Philips Hospitality displays. More on request.
- On screen display for easy installation
  - channel, content, signal strength, SNR, serial number
- Software updatable via broadcast control channel
- L-Bar digital signage
  - Video screen is scaled to allow for L-shaped graphics overlay
  - Requires that video stream be part of MX-GS200/MD-100 modulated sub-channels.

5.3.1.2 Degraded mode

If the receiver does not detect the host during scan or after boot it will operate in degraded mode. In degraded mode the channel map discovered during the scan consists of all channels discovered. The "CHNL" button of the receiver can be used to cycle through that channel list. If the receiver power cycled, only the active channel is persistently stored. No other channels are remembered.

- Scans frequencies and saves current channel to persistent storage
- After scan, cycle through channel map with "CHNL" button to detect desired channel.
- Display signal information with "info" button
- Restart scan with "channel" button (5 seconds)

5.4 FlexDK SDK

The Flex-DK Software Development Kit provides the software, in source code form, necessary for West Pond customers to enable TVs and other devices with broadcast TV tuners with datacasting capabilities. This open source software is licensed for use with WPT products. Each licensee receives a certificate that is used to enable the MX-GS200 (host) to sign the signaling which enables the FlexDK enabled device to receive files. The certificate can be installed or deleted on any MX-GS200. Certificates allow the FlexDK user to protect against unauthorized targeting of data to the target receivers.

5.5 FlexDM remote management

This web service allows you to manage any of the FlexStream devices via the Internet. The MX-GS200 supports this feature. The web service is under construction and will be available for use in the near future.

5.6 Branding

The following branding options are available.

- MX-GS200 Web UI logo
- Rx-W100 Power on screen