VEGA-2000(M)

Full HD HEVC/H.264 Real-time Encoder Module

Quick Start Manual

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History

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0.2	2015.11.13	alpha1	Jennifer.Chang	
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1.1	2018.03.26	V2.5.3	Andrew.Huang	
1.2	2019.0830	V2.6.24	Andy.Chou	

Approved by

Date	Approve
2016.01.25	Dick Lin

Content

1. Product Introduction

1.1 General Introduction

VEGA-2000/VEGA-2000M, is a small form-factor module designed for encoding live video using either advanced HEVC (High Efficiency Video Coding) Main Profile or H.264 BP/MP/HP video compression up to 1080p resolution at 60 frames per second, with CBR (Constant Bit Rate) & VBR (Variable Bit Rate) support from 64kbps ~ 32Mbps. The single SDI-3G or HDMI video inputs provide video capture capability in convenient formats for professional video feeds while the onboard USB 2.0 and gigabit Ethernet ports offer great flexibility in transporting the compressed video stream through wireless (such as WiFi, LTE, etc.) and wireline interconnections to remote and cloud side for archiving or further processing. The SD memory card interface can also be used for local storage. The module also features audio encoding from either embedded SDI/HDMI audio channels or a separate 3.5mm audio jack socket.

The module is supplied with a bundled software package that demonstrates a streamlined workflow from video acquisition, encoding, streaming to archiving in a hassle-free approach for simplifying system adoption and integration effort. The well-defined web-based software APIs open the possibilities for customization based on the final usage cases.

With a small physical dimension and low power dissipation characteristics, VEGA-2000/VEGA-2000M can be easily applied to portable and mobile broadcasting, medical imaging, UAV (Unmanned Aerial Vehicle) applications, etc. where real-time and high-quality video content needs to be captured and transported in an efficient way using the latest HEVC compression standard.

1.2 Packing List

Before you begin installing your card, please make sure that the following items have been shipped:

- 1 VEGA-2000/VEGA-2000M
- 1 Power Adapter (VCC12 Load 0.4A)

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

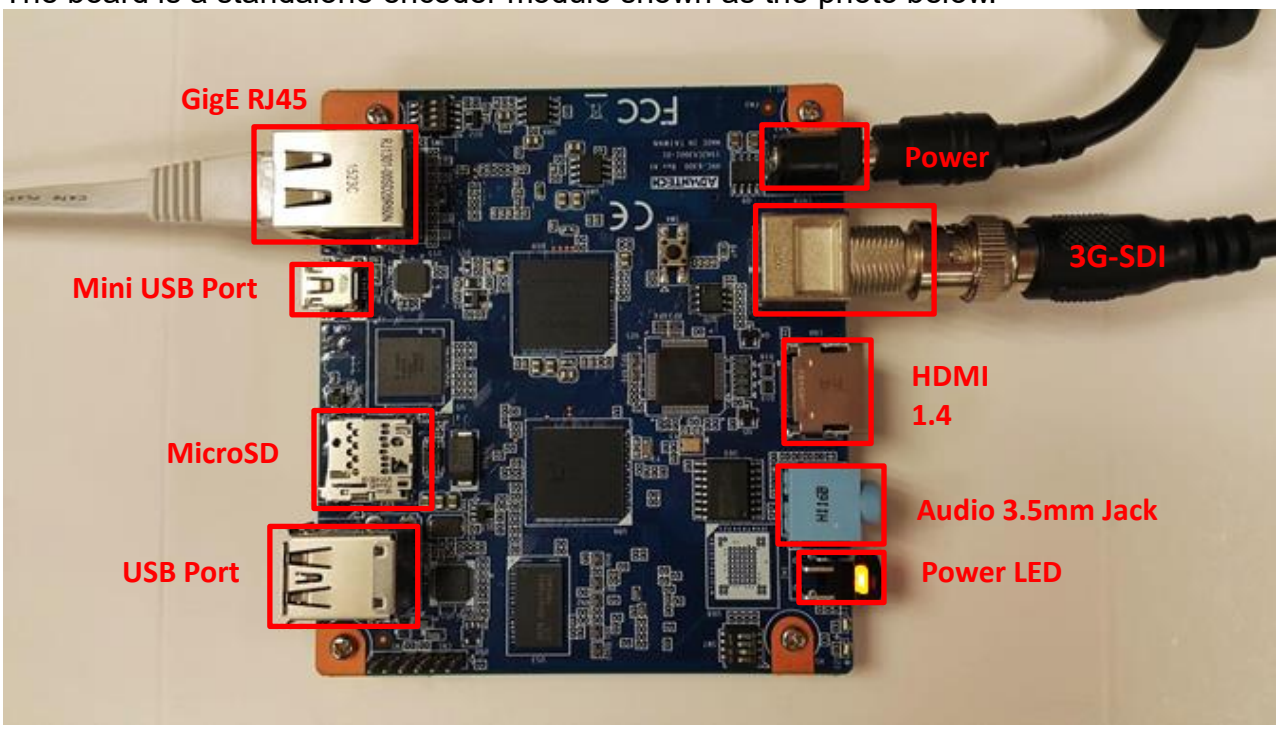
[NOTE]
Acrobat Reader is required to view any PDF file. Acrobat Reader can be downloaded at:
http://www.adobe.com/Products/acrobat/readstep2

Product Specifications

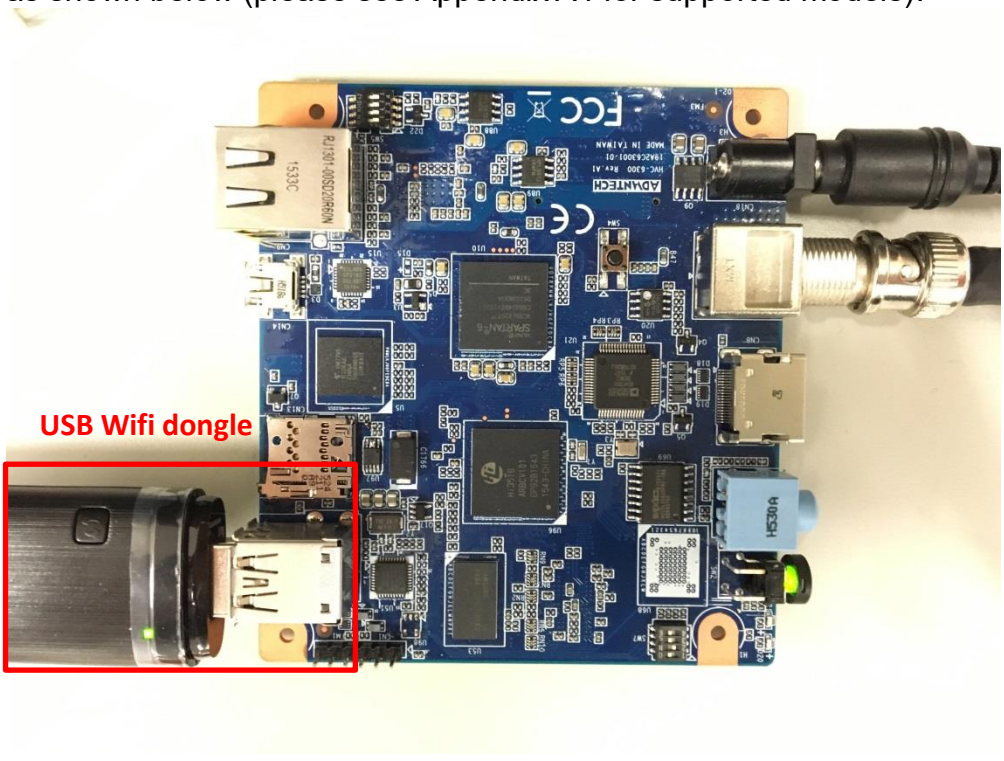
Hardware	**Features**	1-ch HEVC/H.264 1080p60 encode 1-ch SDI-3G & HDMI video inputs One audio phone jack input One USB 2.0 Type-A connector One gigabit Ethernet RJ-45 connector One SD Card connector One mini-USB console port Onboard 1GB DDR3 memory
	Form-factor	Small form-factor (90x100 mm)
	Power Consumption	< 5W (VCC12 Load 0.4A)
	Operating Temperature	0C to +40C ambient air temperature around board
Video Input	**Channels**	1 (up to 1080p60, 8bit, YUV)
	Video Formats	HD, SD
	Frame Rates	HDMI 1.4 Interface 1920x1080: 60p / 59.94p / 50p / 30p / 29.97p / 25p / 24p 1280x720: 60p / 59.94p / 50p / 30p / 29.97p / 25p / 24p 720x576: 50p 720x480: 60p / 59.94p BNC (3G-SDI) Interface 1920x1080: 60p / 59.94p / 50p / 30p / 29.97p / 25p / 24p 1280x720: 60p / 59.94p / 50p / 30p / 29.97p / 25p / 24p 720x576: 50p 720x480: 60p / 59.94p
	Chroma Sampling Format	4:2:2 / 4:2:0
	Interfaces (only one active)	HDMI 1.4 3G-SDI BNC (SMPTE424M Level A)
Video Output	**Compression**	H.265/H.264
	HEVC Profile	Main
	HEVC Tier	Main
	HEVC Level	1.0 / 2.0 / 2.1 /3.0 / 3.1 / 4.0 / 4.1
	Bitrate 1080P format	64 Kbps ~ 32 Mbps
	Bit Depth / Chroma Subsampling	8 bit / 4:2:0
	Bit Rate Control	CBR/VBR
	Output Format	RTSP/MP4
Audio	**Channels**	Up to 2
	Format	AAC encoding
	Sampling Rates	48Khz/16bit
	Connectors	HDMI 1.4 / SDI-3G / Line-In
Web	**PC/Mobile phone**	IE/Chrome/FireFox
HDMI Out	**Video Resolution and Frame Rates**	1920x1080: 60p / 59.94p / 50p / 1280x720: 60p / 59.94p / 50p /

2. Installing VEGA-2000

The board is a standalone encoder module shown as the photo below.

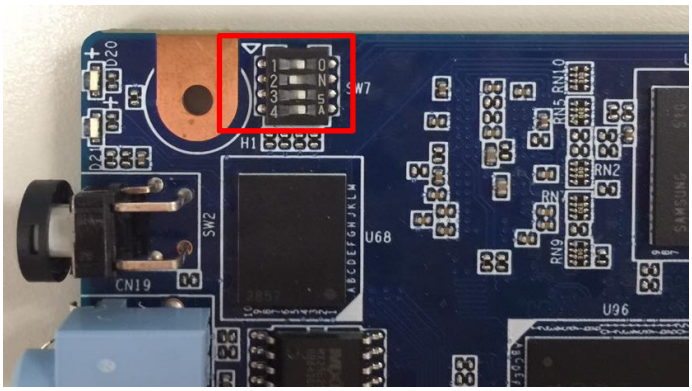


The VEGA-2000 can also interface to a wireless LAN by using a WLAN dongle in the USB port as shown below (please see Appendix A4 for supported models).



Follow these steps below to ready the card for use:

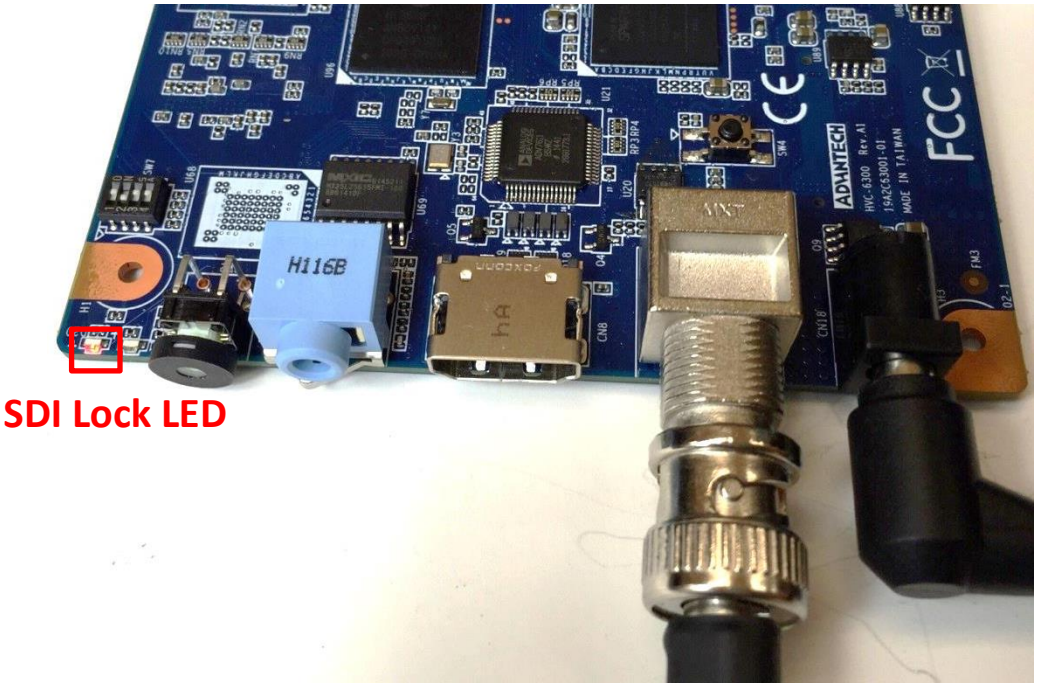
1. SW7 is boot mode switch, it should be switch to “1011”.



2. Connect an Ethernet cable or a USB wifi dongle (supports Hotplug).
3. Connect a video source to SDI / HDMI video inputs.
4. Connect the power adaptor to power jack.(When power on ,the power LED is Green)

[NOTE]

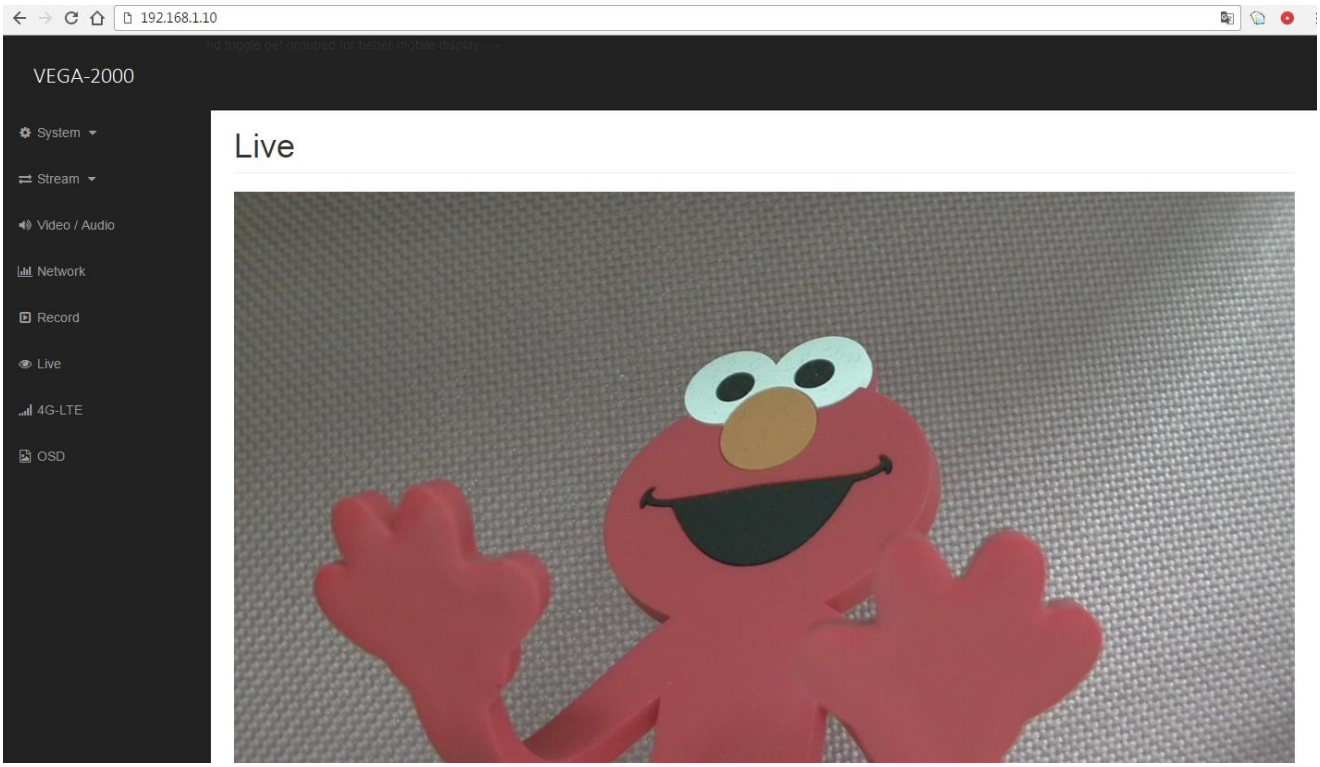
- The default video input is SDI source. If the module locks to a supported SDI mode, the lock LED will glow red.



Start using VEGA-2000(M)

2.1 Accessing the Module Across Wired Network Using the Web Browser

1. The default IP address for the Ethernet port is 192.168.1.10
2. Please setup your PC to the same domain to connect to VEGA-2000(M) (192.168.1.x)
3. Start the Web browser on the computer and type 192.168.1.10 in the URL address bar
4. The Live page should be displayed as follows.

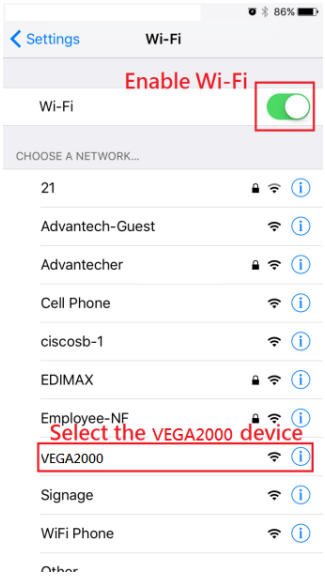


2.2 Accessing the Module Across Wireless LAN Using Web Browser

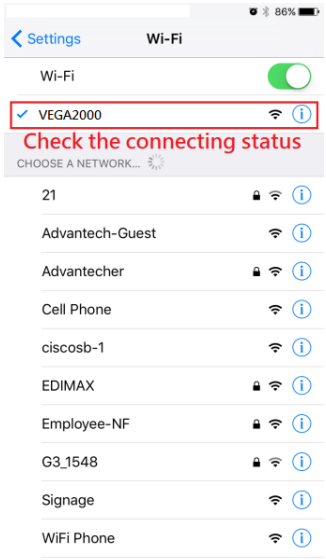
- **IOS system setting example**

Step1.

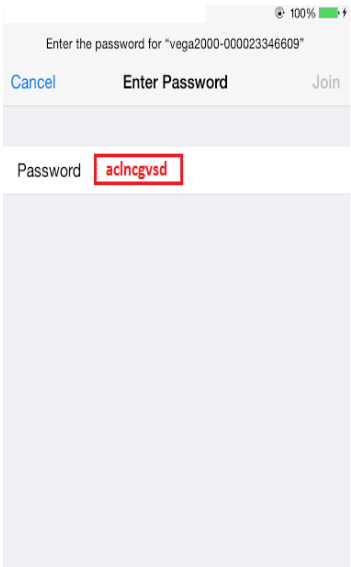
Step2.



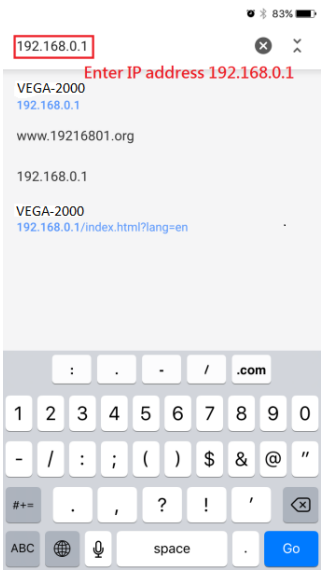
Step3.



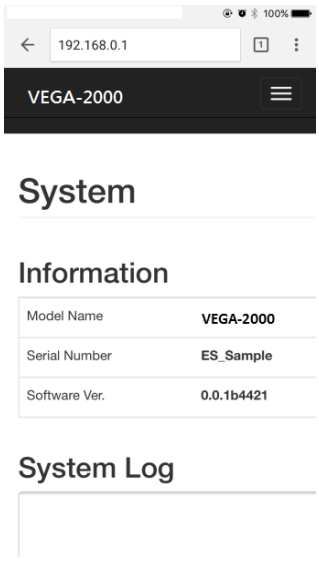
Step4.



Step5.



Step6.

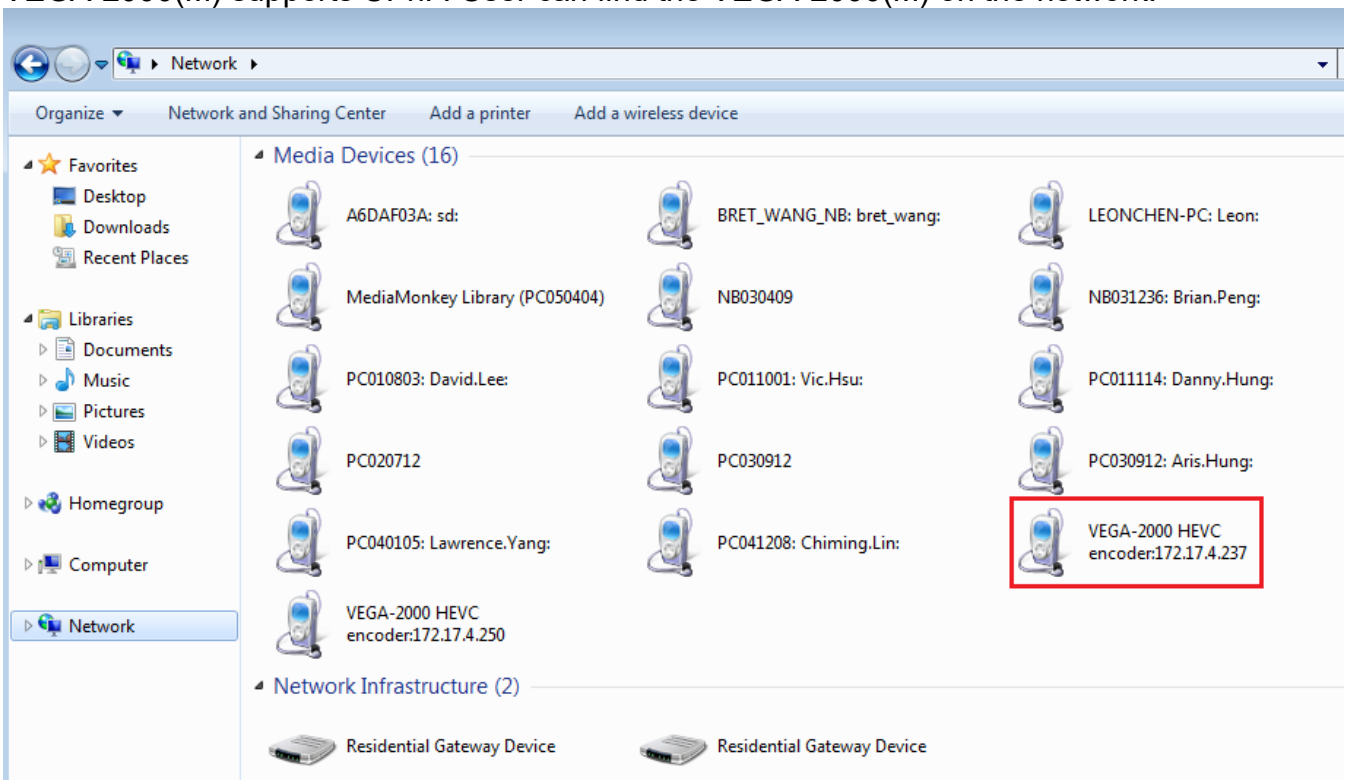


[NOTE]

- The Wi-Fi default IP address is “192.168.0.1”.
- The Wi-FI password is ”aclncgvsd” .

2.3 UPnP

VEGA-2000(M) supports UPnP. User can find the VEGA-2000(M) on the network.



2.4 Upgrading Firmware

The VEGA-2000(M) factory default firmware can be automatically updated by means of a USB storage thumb drive.

1. Prepare an empty USB disk
2. Download or get firmware file from your Advantech contact
3. Put firmware file, “VEGA2000_XXXX.upd”, onto the USB disk.
4. Insert USB to VEGA-2000(M) module and remove other devices (LAN & video source) except for power adaptor .Then power on it.
5. Power LED will keep blink red light, this indicate upgrade is on-going.
6. After firmware update finish, module will be powered off automatically. And Power LED will be Red light.
7. Please remember to remove USB disk.
8. Checking software version from Web, System → Information → Software version

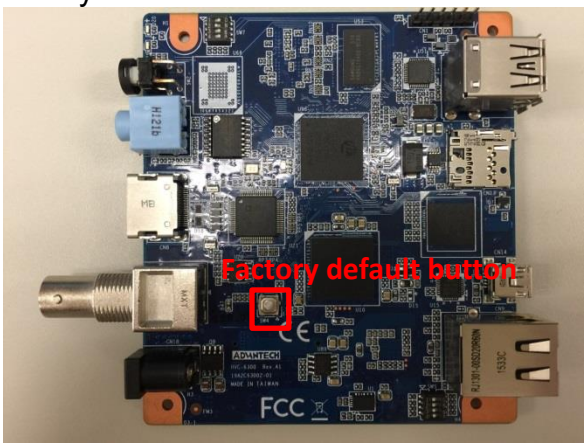
[NOTE]

- After VEGA-2000(M) powers on, if you insert the USB with the firmware file within 40 seconds, VEGA-2000(M) module will execute the update firmware. And after firmware update, VEGA-2000(M) will be powered off.
- But if there is no firmware file (VEGA2000_XXXX.upd) in the USB which you insert in,

VEGA-2000(M) will neither execute update nor power off.
Beware that if VEGA-2000(M) has powered on over 40 seconds, then no matter which USB (with firmware file or not) you insert afterwards, VEGA-2000(M) will neither execute update nor power off.

2.5 Restore VEGA-2000(M) to factory default

A hard reset will restore VGEA-2000(M) to factory default settings. We could see SW4 button was near to SDI connector. Please push the button for more than 5 seconds, and then restore VGEA-2000(M) to factory default setting. After restore to default, VGEA-2000(M) will reboot automatically.

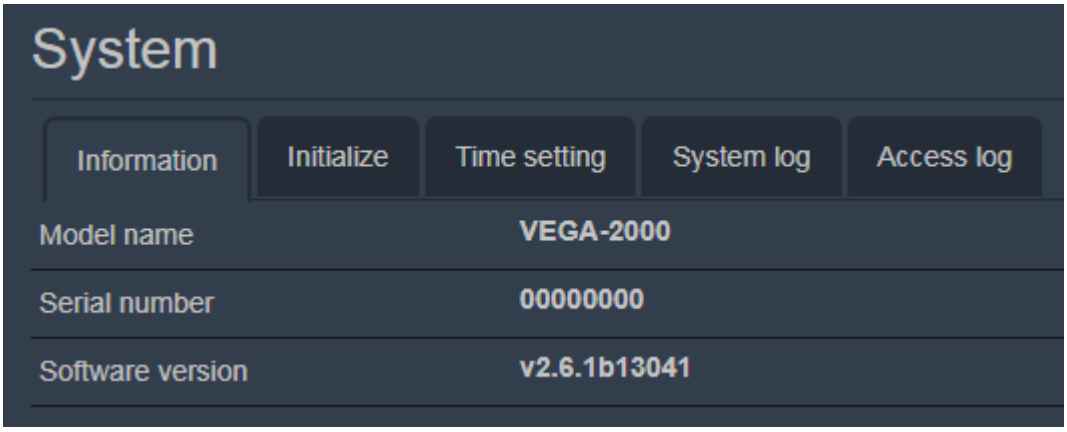


※[NOTE] Please restore VEGA-2000(M) to factory default after upgrading V2.0 and later version Firmware.

3. VEGA-2000(M) Web

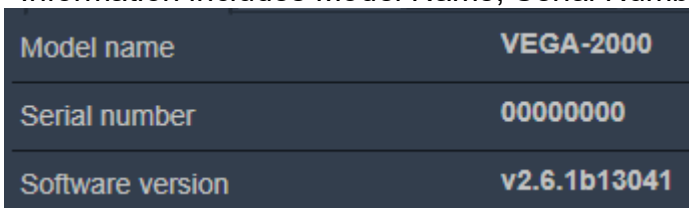
3.1 System Page

This System page to show Information, Initialize, Time setting, System Log and Access Log



1. Information

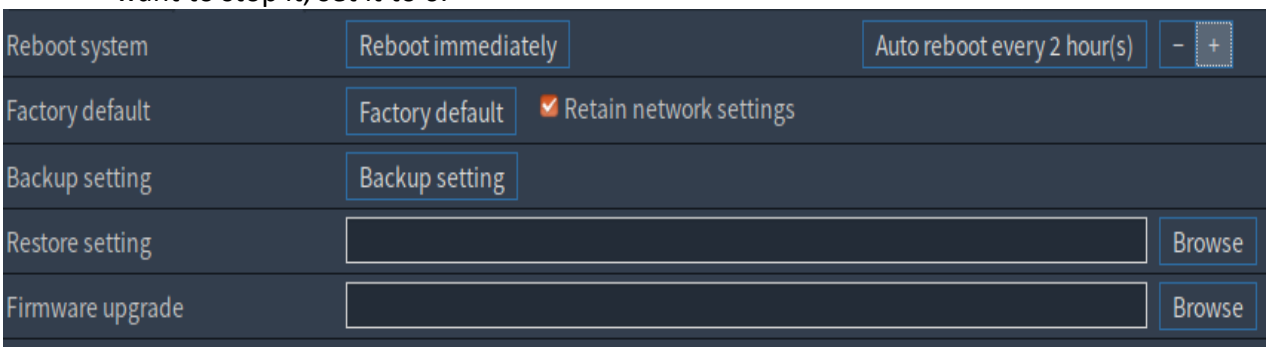
Information includes Model Name, Serial Number and Software Version



2. Initialize

It provide option to reboot system or restore factory default or backup setting to system and upgrade system firmware.

- Reboot system provides two options, Reboot immediately and Auto reboot.
  Regarding Auto reboot, user can set the time (in hour) for the system reboot regularly, if you want to stop it, set it to 0.



3. Time setting

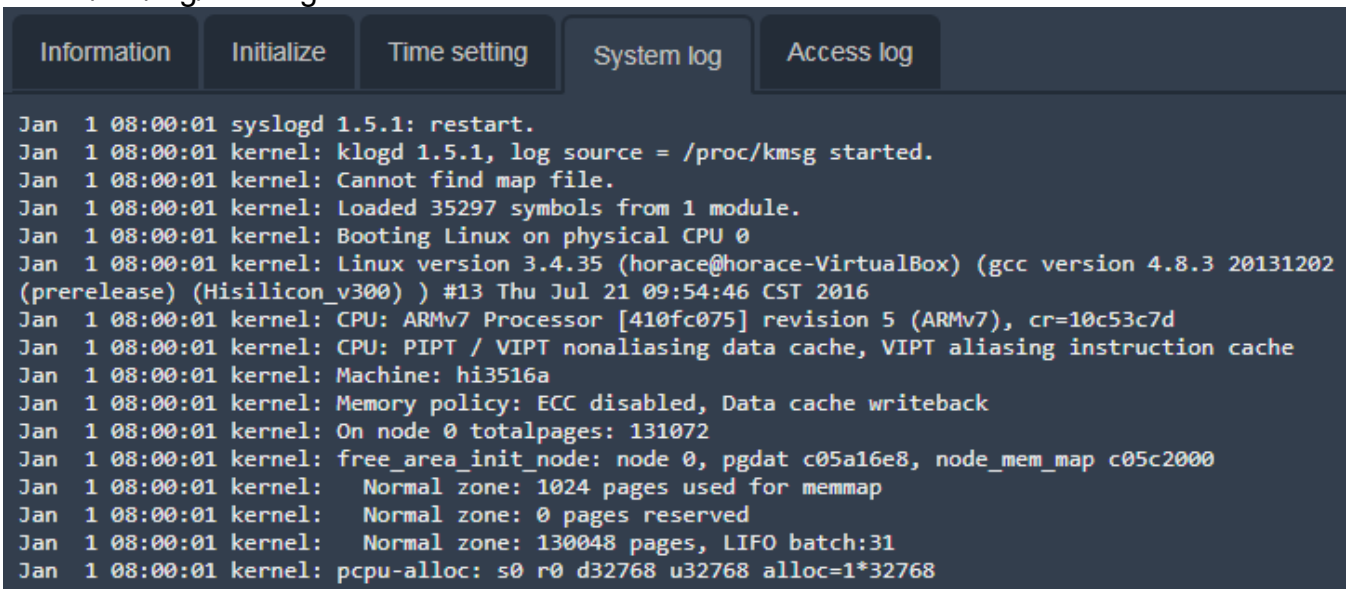
Set the system clock

- Set system clock manually
  User can set system clock manually. (format: MMDDhhmmYYYY)

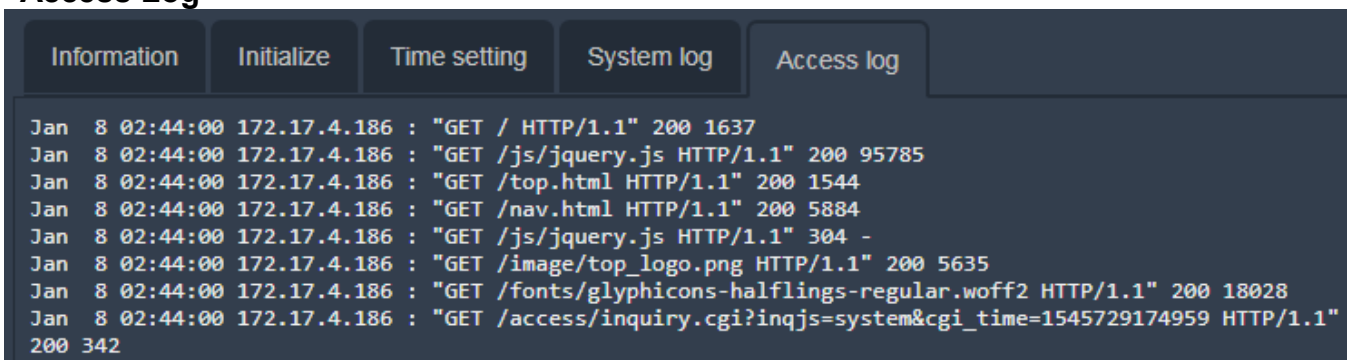
- Synchronize system clock to Network Time Protocol (NTP)
  Check the NTP to set NTP Server and Time Zone.

4. System Log

Show /var/log/messages

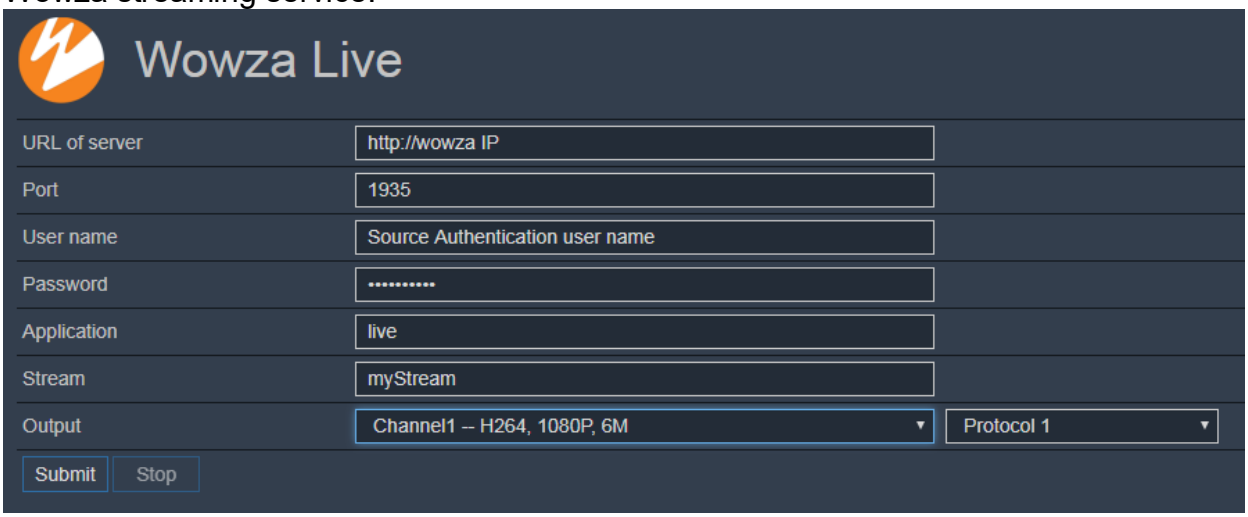


5. Access Log



3.2 Broadcast Settings Page

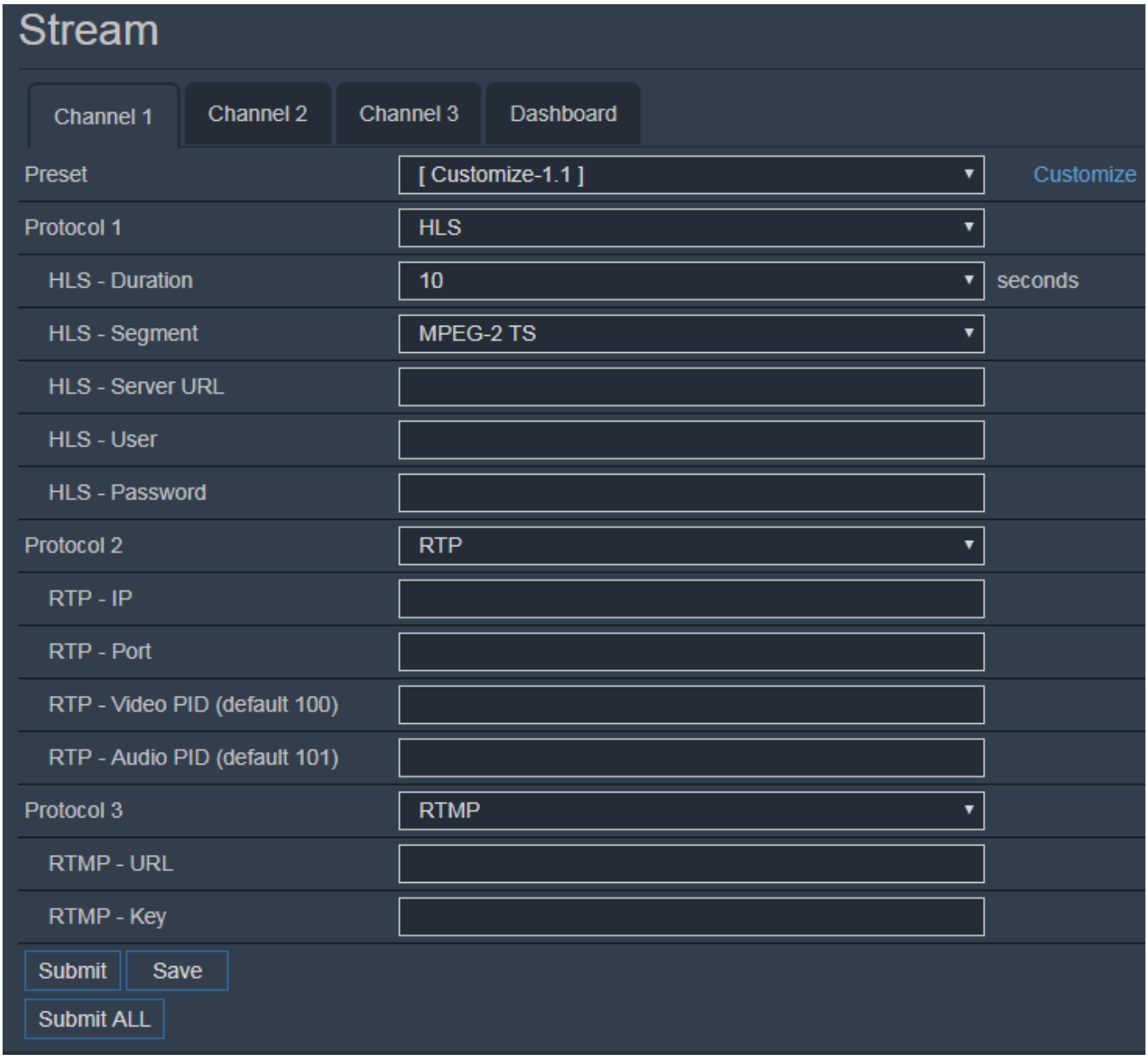
VEGA-2000/2000M support Wowza live streaming protocol. User can fill parameter to link Wowza streaming service.



1. **URL of server**
   The URL of **Wowza** media server.
2. **Port**
   Video streaming port number.
3. **User name**
   Set the username.
4. **Password**
   Set the password.
5. **Application**
   Set the application name.
6. **Stream**
   Set the stream name.
7. **Output**
   Select the streaming source.
8. **Submit**
   Output setting to Stream page

3.3 Stream Settings Page

Use this Stream page to set the items for the Channel1/ Channel2/ Channel3. The capabilities of each stream depend on the input resolution and frame rate – see Appendix A for details



Channel 1/2/3 Configuration:

1. **Preset**
   The preset menu provides some basic settings.
2. **Customize**

If the preset menu was unable to meet your demand, the Customize can set other options.(refer next page “13.Video Setting”)

3. **Protocol 1**
   Select HLS, RTMP, TS over IP or off.
4. **Protocol 2**
   Select RTMP, TS over IP or off.
5. **Protocol 3**
   Select RTMP, TS over IP or off.
6. **HLS - Duration**
   If set Protocol 1 to “HLS”, the duration of HLS can be set.
7. **TS – Protocol**
   If set Protocol 1/2/3 to “TS over IP”, the TS-protocol can select tcp or udp.
8. **TS – IP**
   If set Protocol 1/2/3 to “TS over IP”, the client IP of TS can be set.
9. **TS – Port**
   If set Protocol 1/2/3 to “TS over IP”, the client Port of TS can be set.
10. **RTMP – URL**
    If set Protocol 1/2/3 to “RTMP”, the URL of RTMP can be set.
11. **RTMP - Key**
    If set Protocol 1/2/3 to “RTMP”, the Key of RTMP can be set.
12. **Multicast RTSP Enable**
    Enable Multicast RTSP or not.
13. **Multicast – IP**
    If Multicast RTSP was enabled, the IP of multicast can be set.
14. **Multicast – Port**
    If Multicast RTSP was enabled, the IP of multicast can be set.
15. **Customized (Video Setting)**

- **Encoding**
  Select H.265, H.264 or off. Note Channel 1 cannot be turned off.
- **Resolution**
  Select the resolution of encoded output stream. The module will scale as needed.
- **Frame rate**
  Set the frame rate of the output stream.
- **I-picture interval**
  Set the I-picture insertion interval in seconds.
- **H264 Profile**
  Set the profile setting for H.264 to high, main or baseline if H.264 is used.
- **Bit rate compression mode**
  Select Constant Bit Rate (CBR), or Variable Bit Rate (VBR).
- **Bit rate**
  When you set Image codec to H.265/H.264 and set Bit rate compression mode to CBR, the target bit rate of the output stream can be set.
- **Image quality**
  When you set Image codec to H.265/H.264 and set Bit rate compression mode to VBR, the quality of the output stream can be set. (1 being the lowest and 10 being the highest)

[NOTE]

Only channel1 can enable Multicast RTSP and set Multicast-IP & Multicast-Port.
Channel2 & channel3 only can set Multicast-Port when channel1 enable Multicast RTSP.

Dashboard information:

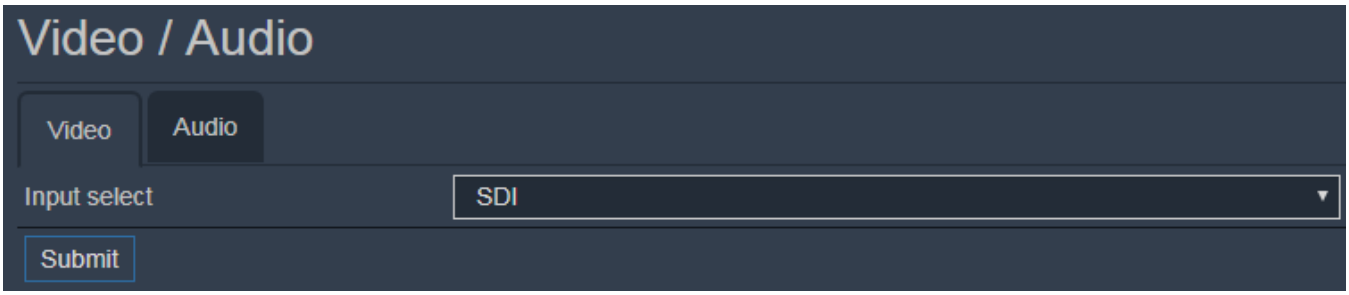
This page display stream status of channel 1/2/3.

Channel 1 | Channel 2 | Channel 3 | Dashboard

#	Encode	Frame rate	Bitrate(kbps)	Dropped(fps)
Channel 1				
Protocol 1	--	--	--	--
Protocol 2	--	--	--	--
Protocol 3	--	--	--	--
Channel 2				
Protocol 1	--	--	--	--
Protocol 2	--	--	--	--
Protocol 3	--	--	--	--
Channel 3				
Protocol 1	--	--	--	--
Protocol 2	--	--	--	--
Protocol 3	--	--	--	--

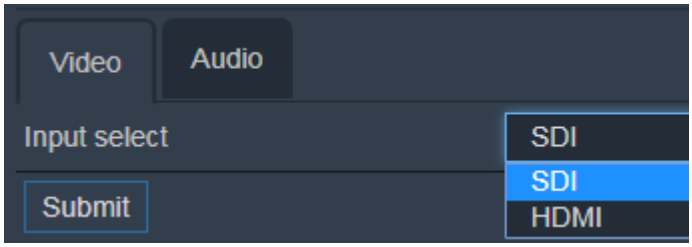
3.4 Video/Audio Stream

Use this Video/Audio page to set the video and audio details for the active stream



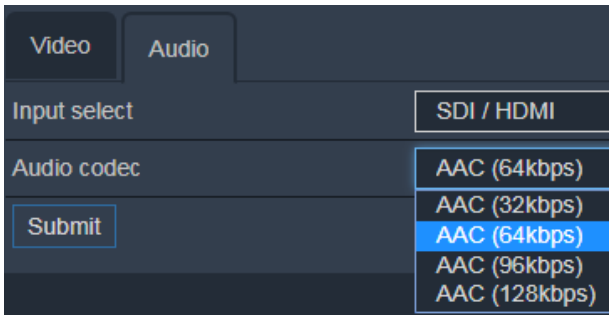
1. Video Stream

- **Input Select**
  User can set either SDI or HDMI inputs for Video Stream.



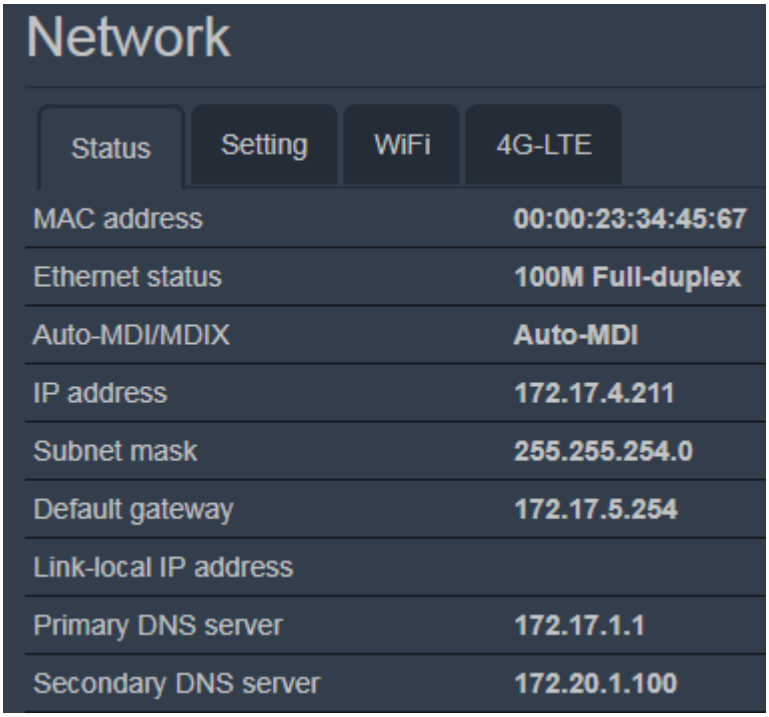
2. Audio Stream

- **Input Select**
  User can set either SDI/HDMI or External Audio Jack inputs for Audio Stream.
- **Input Level**
  You can select Microphone or Line in while Audio Select is “External Audio Jack”.
  The module will provide voltage bias for Microphone if Input Level is “Microphone”.
- **Sample Rate**
  User can set the sample rate of audio stream in while Audio Select is “External Audio Jack”.
- **Audio Codec**
  User can set the bit rate of audio stream

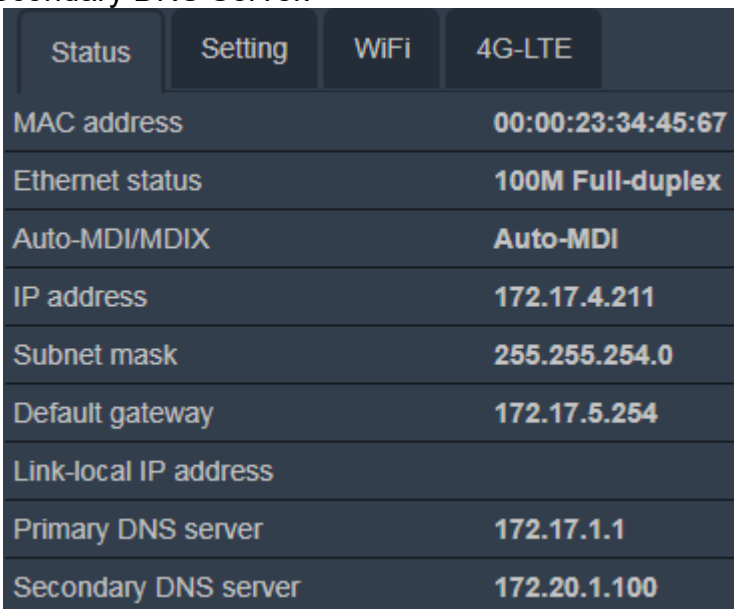


3.5 Network settings

Use this Network page to show or set the items for the Network.

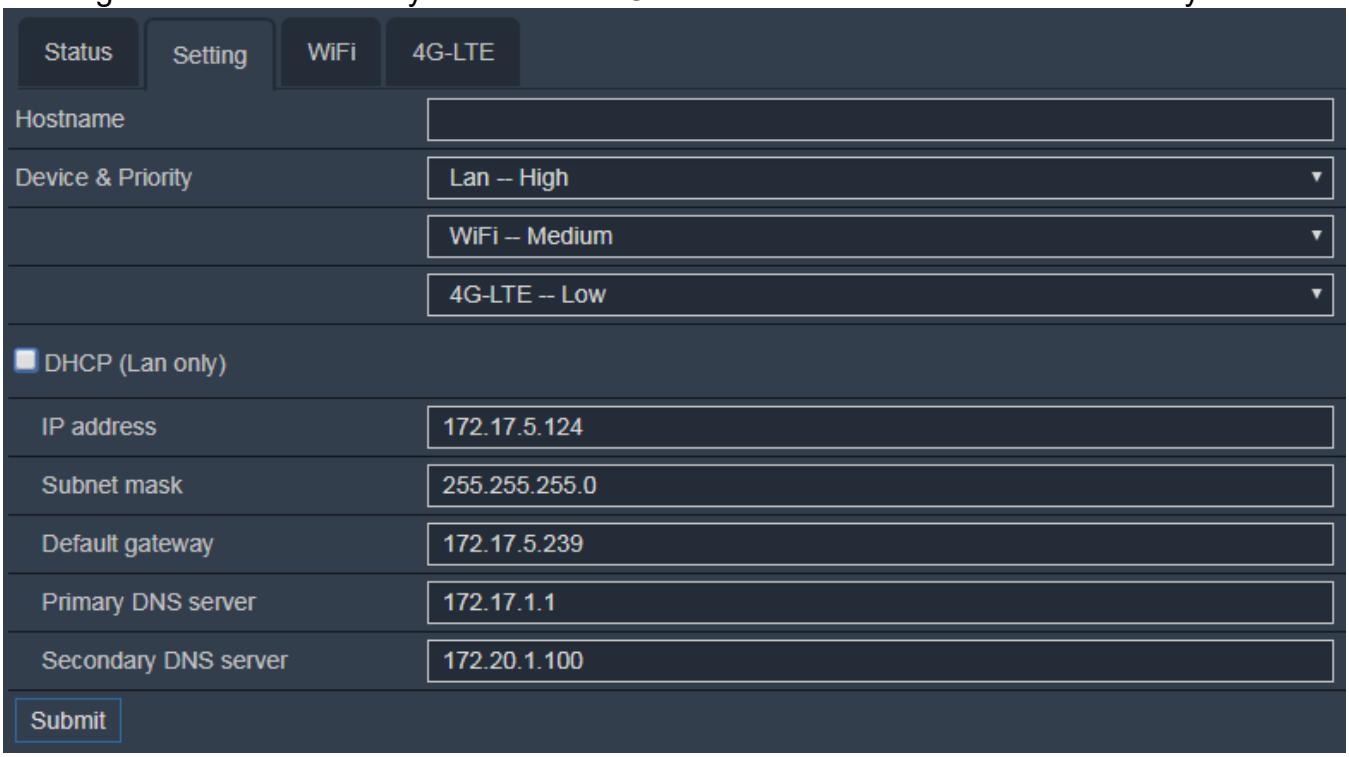


1. **Status**
   Show the Network status include MAC Address, Ethernet Status, Auto-MDI/MDIX, IP Address, Subnet Mask, Default Gateway, LinkLocal IP address, Primary DNS Server, Secondary DNS Server.

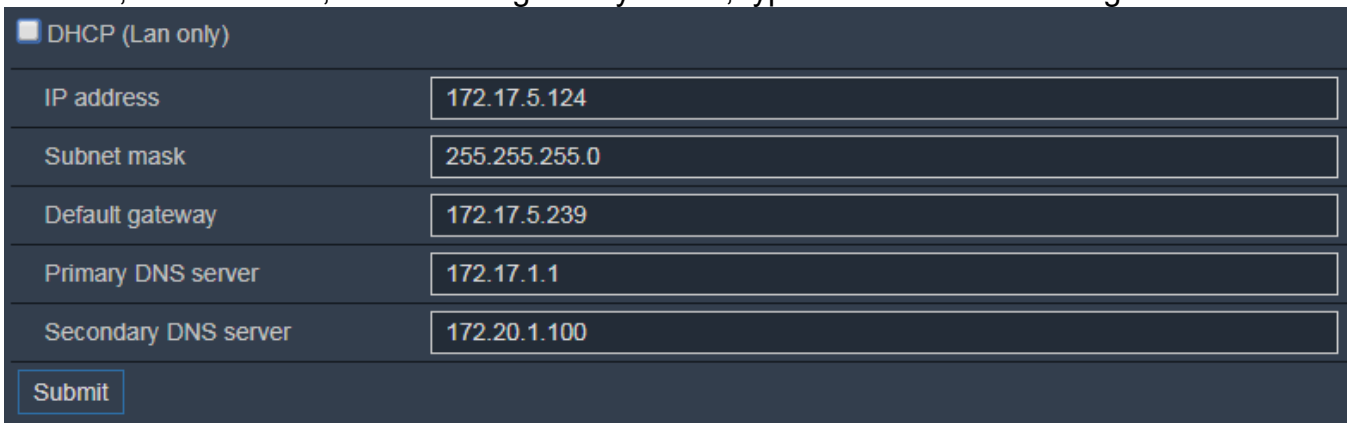


2. Setting

- It can configure Ethernet connection priority for Lan, WIFI and 4G-LTE. To get IP settings of Lan automatically check the DHCP to obtain an IP address automatically.

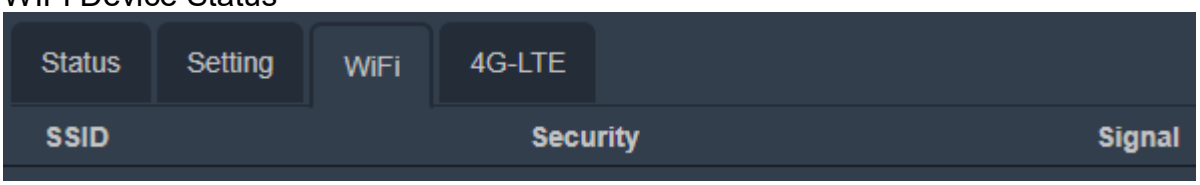


- To specify an IP address, click Use the following IP address, and then, in the IP address, Subnet mask, and Default gateway boxes, type the IP address settings.



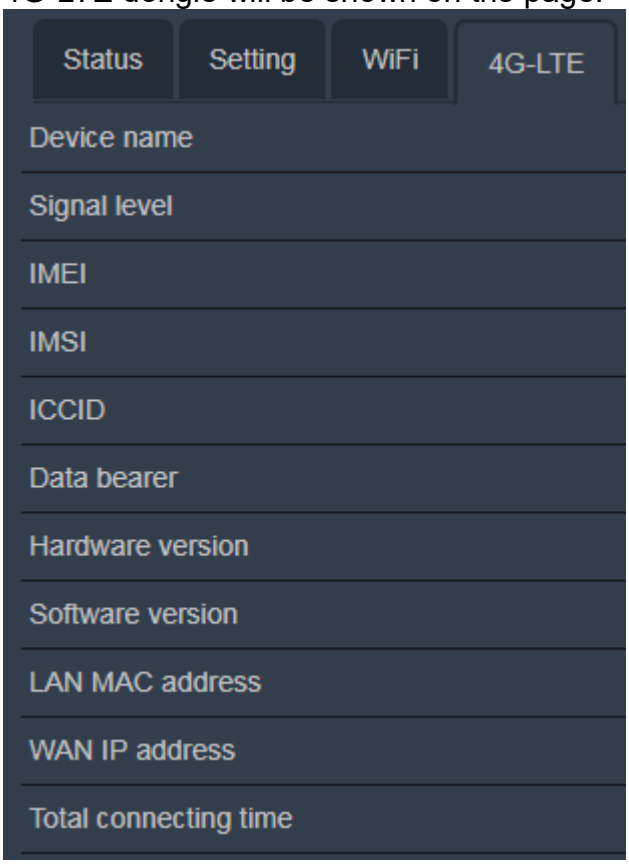
3. WIFI

WIFI Device Status



4. 4G-LTE

4G-LTE page shows the information of 4G-LTE dongle, include Device Name, IMEI, IMSI, Hardware Version, Software Version, LAN MAC Address, WAN IP Address, and Total Connect Time. When plug in dongle and wait about 25 seconds, the information of 4G-LTE dongle will be shown on the page.



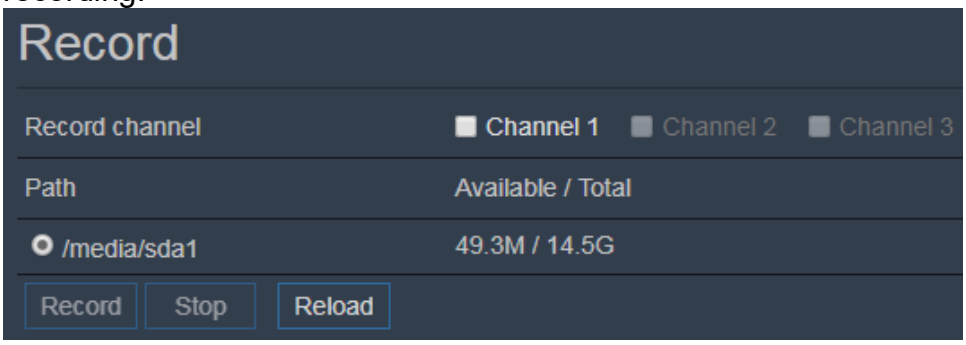
[NOTE]

Currently, VEGA-2000(M) only supported **HUAWEI E3372h** 4G-LTE dongle.

3.6 Record settings

Use this Record page to set record for Channel1/ Channel 2/ Channel 3.

- **Record Channel**
  You can check the want of the stream channel to record. The default **video setting** is Channel 1(H265) / Channel 2(Off) / Channel 3(Off). So you can only check the stream1 recording.



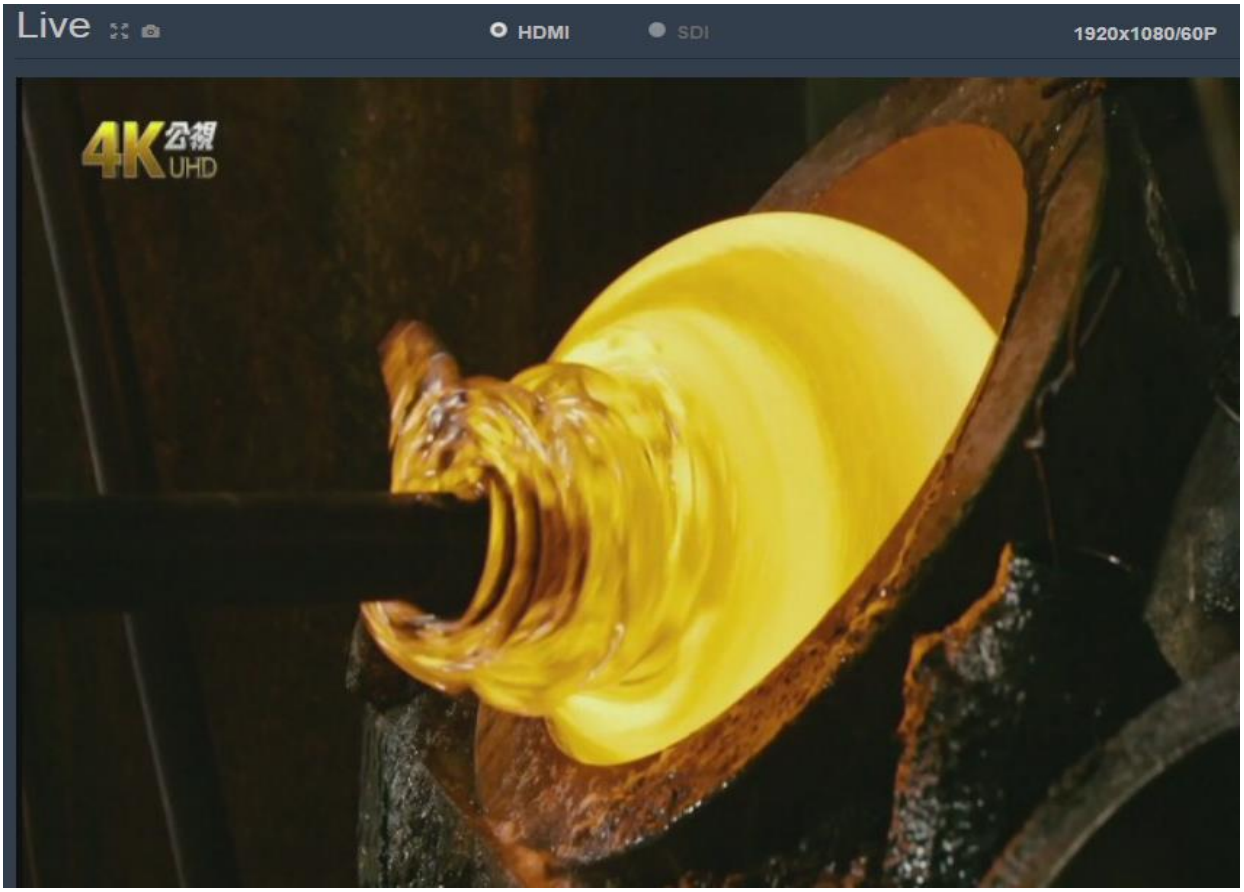
- **Storage Path**
  You can insert USB or SD card storage and press the “Reload page” button. It will show the information of storage.
- **Record**
  Check the want of the stream channel to record and check the recording path.
  Press the “Record” button to start recording.
- **Stop**
  Press the “Stop” button to stop recording.

[NOTE]

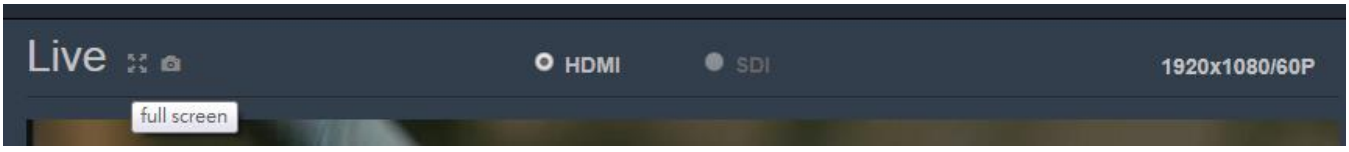
- While recording, the “Power LED” will flash yellow light. The “Power LED” will be yellow light after stopping recording.
- Stream1 had video and audio recording, stream2 & stream3 only have video recording.
- **File format support FAT32 and exFAT**

3.7 Live

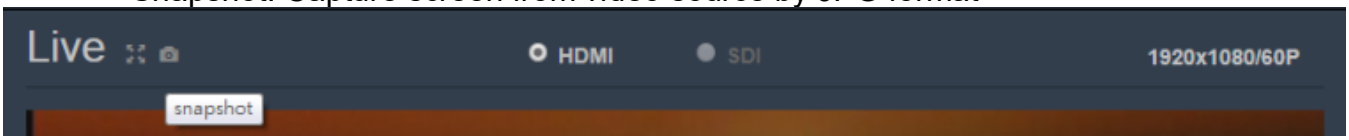
Live page shows live video from video source. It can be selected to get video source from SDI or HDMI.



- Full Screen: Enable Live video to full screen



- Snapshot: Capture screen from video source by JPG format

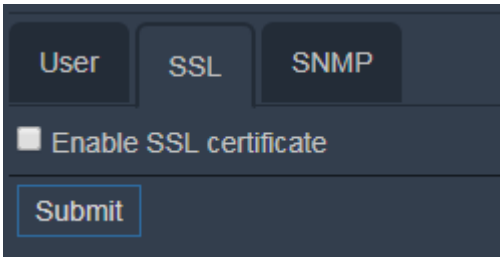


3.8 Security

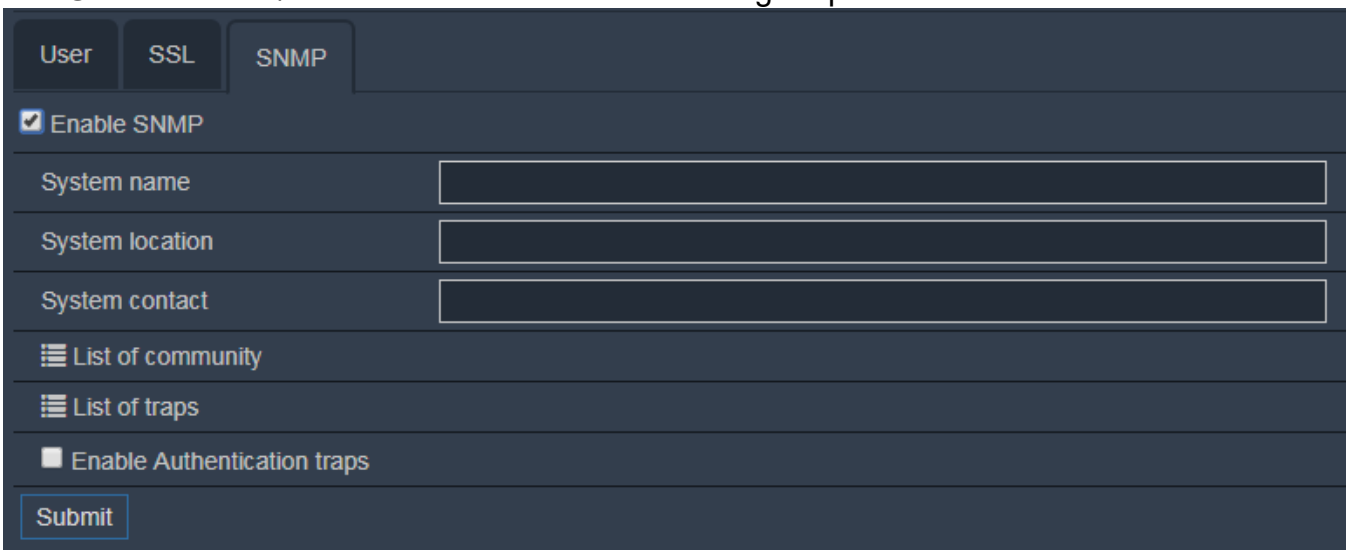
Security page can enable user account to control VEGA-2000/2000M through WebUI.

- **User:** Configure User and Password to enable account

- **SSL:** Enable/Disable SSL certificate

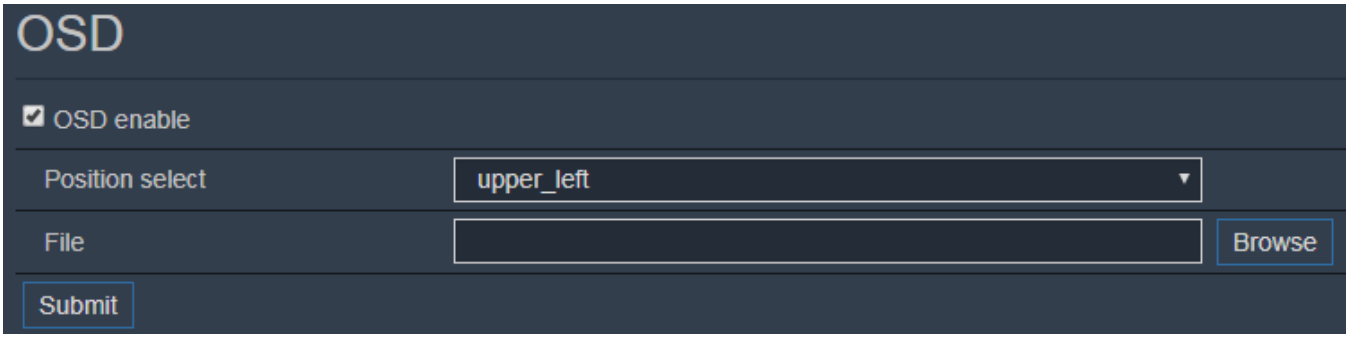


- **SNMP:** Enable/Disable SNMP function and configure parameter for SNMP.



3.9 OSD

Use this OSD page to set OSD in streaming of Channel 1.
Check the OSD Enable to upload OSD file and set the position of OSD.



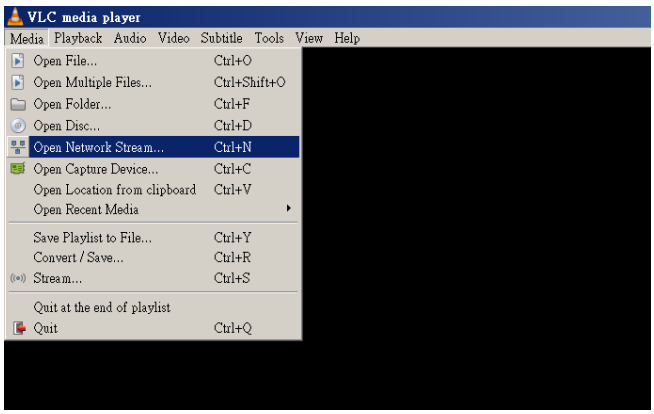
[NOTE] OSD file only support *.bmp and maximum size of OSD file is 5M.

4. How to stream

4.1 RTSP/RTP

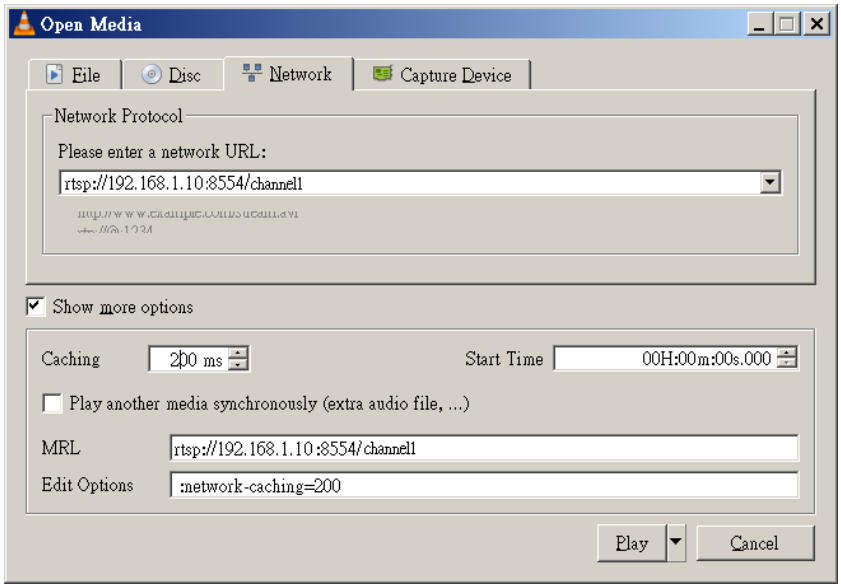
This section shows how to open RTSP streaming from VLC on a suitable player. Please make sure that SDI / HDMI source is connected to VEGA-2000(M) correctly before starting.

1. Open Network Stream from VideoLAN VLC media player



2. Use this URL to open RTSP video, it is recommended to set caching to small value.

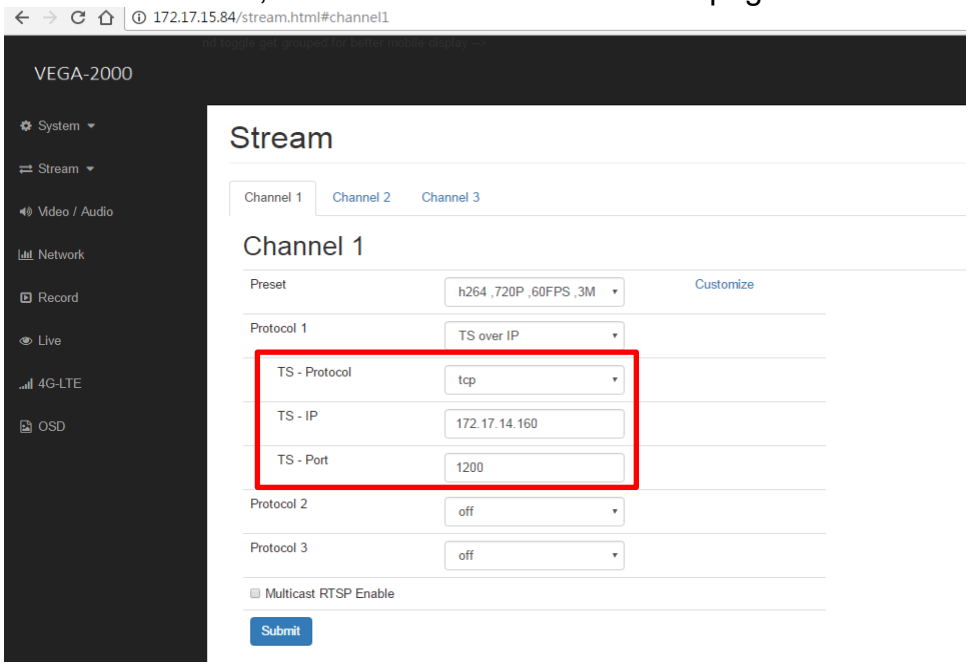
```
rtsp://{VEGA2000-ip-address}:8554/channel1
```

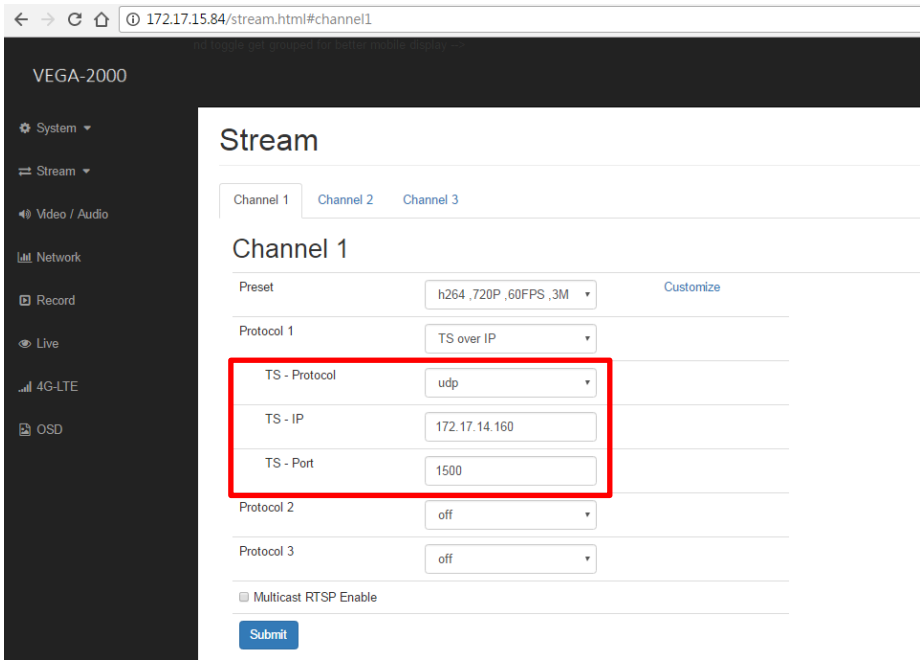


4.2 MPEG-TS

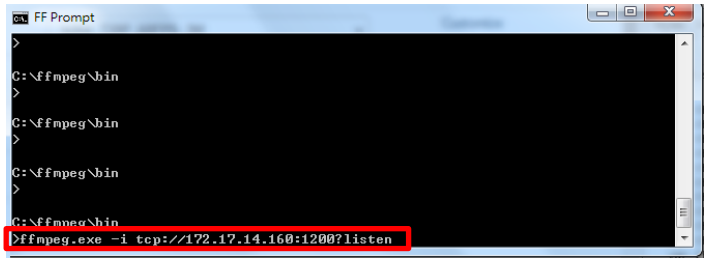
This section shows how to play MPEG-TS from ffmpeg. Please make sure that SDI / HDMI source is connected to VEGA-2000(M) correctly before starting.

1. Install ffmpeg in window
   (1) download static version https://ffmpeg.zeranoe.com/builds/
   (2) Uncompress and put it in property place
   (3) Set system environment path
2. Set **TS–Protocol** ,**TS–IP** and **TS–Port** on stream page of VEGA-2000(M) WebGUI.

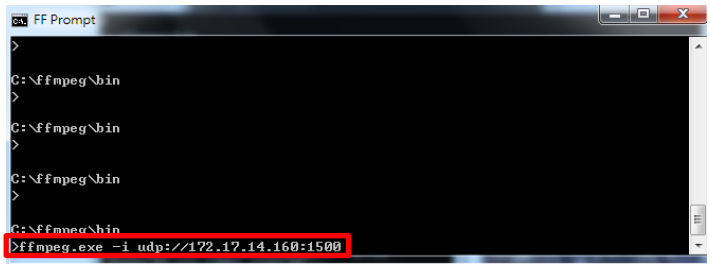




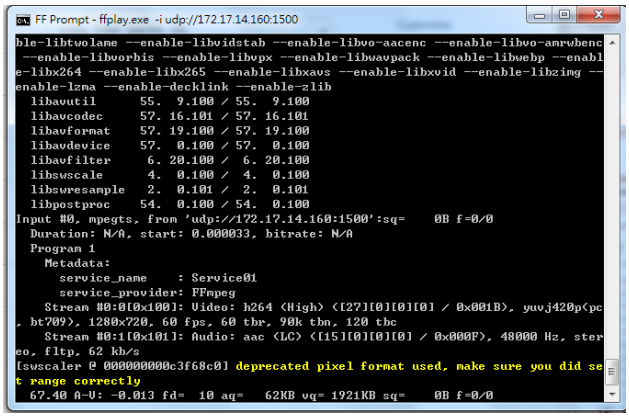
3. If **TS–Protocol** set TCP, execute “ffplay -i tcp://*TS-IP*:*TS-Port*?listen” in windows command line.



If **TS–Protocol** set UDP, execute “ffplay -i udp://*TS-IP*:*TS-Port*?” in windows command line.



4. After a few seconds, MPEG-TS play from ffmpeg.



[NOTE]

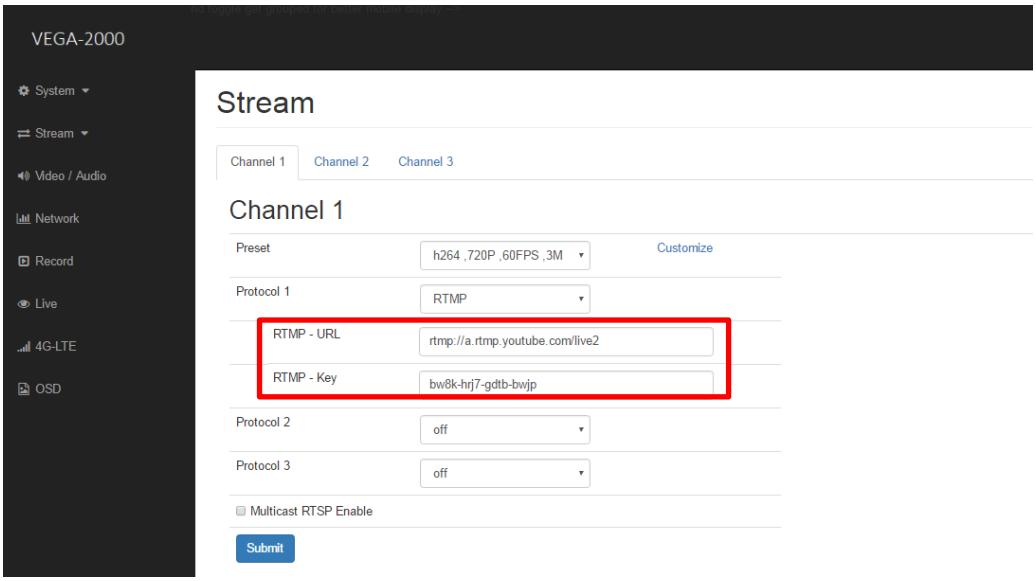
- If **TS-protocol** set to TCP, please execute ffplay first and submit settings.
- “**TS-IP**” means the PC IP.
- Multicast UDP streaming Address : 224.0.0.0 to 239.255.255.255.

4.3 RTMP

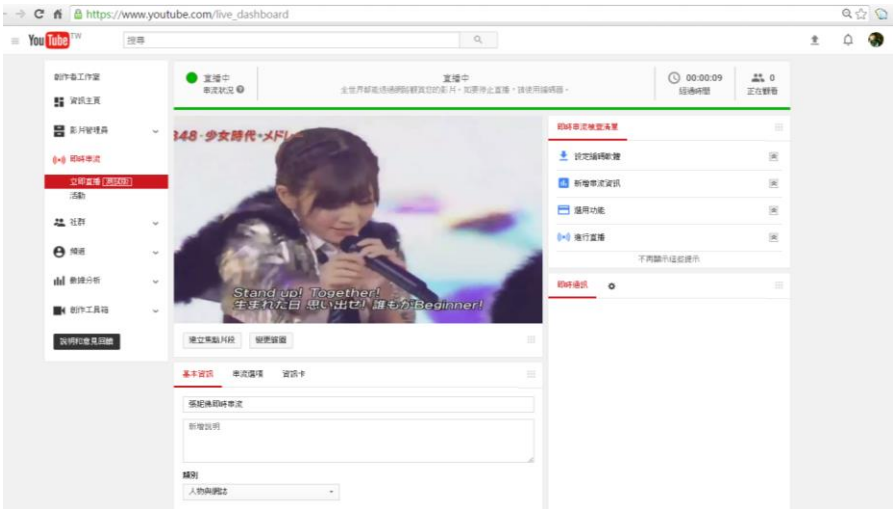
This section shows how to play RTMP from Youtube & Facebook. Please make sure that SDI / HDMI source is connected to VEGA-2000(M) correctly before starting.
[NOTE] No support HEVC in flv only support H264.

1. Youtube

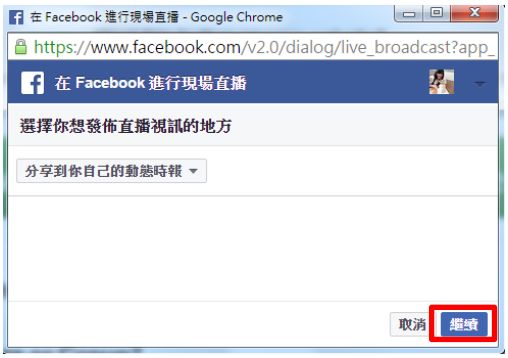
(1) YouTube Dashboard https://www.youtube.com/live_dashboard
(2) You can get Server URL : "*rtmp://a.rtmp.youtube.com/live2*"
and Stream name/key : "*xxxx-xxxx-xxxx-xxxx*"
(3) Fill in the corresponding RTMP Key and RTMP URL on stream page of VEGA-2000(M) WebGUI.



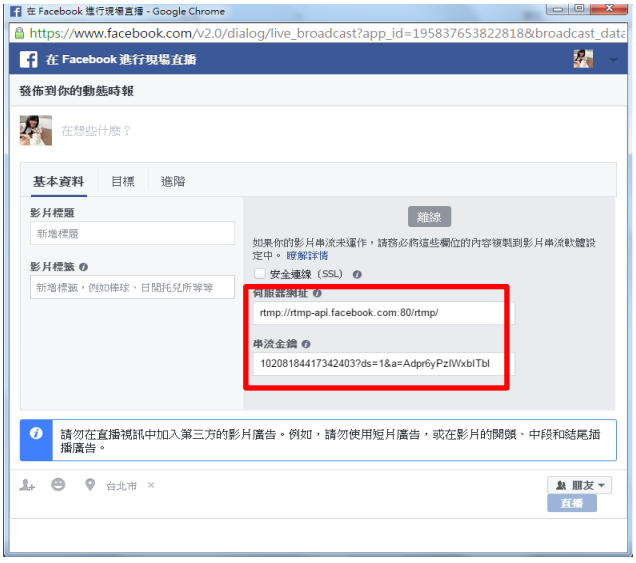
(4) Submit
(5) You can start streaming to Youtube Live.



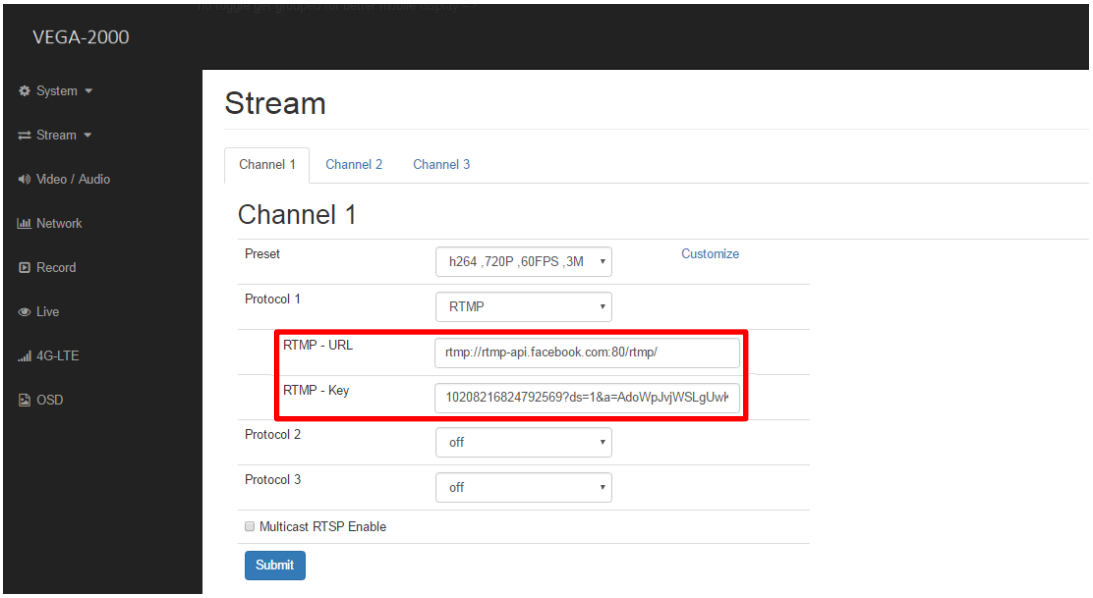
2. Facebook
   (1) How to Broadcast from your Computer with Facebook Live
   http://iag.me/socialmedia/broadcast-computer-facebook-live/
   (2) Press Facebook Live Button and broadcast on Facebook Live
   (3) Continute



   (4) You can get Server URL : "*rtmp://rtmp-api.facebook.com:80/rtmp/*"
   and Stream name/key : "*xxxxxxxxxxxxxxxx?ds=1&a=xxxxxxxxxxxxxxx*"



   (5) Fill in the corresponding RTMP Key and RTMP URL on stream page of VEGA-2000(M) WebGUI



(6) Submit
(7) You can start streaming to Facebook Live.

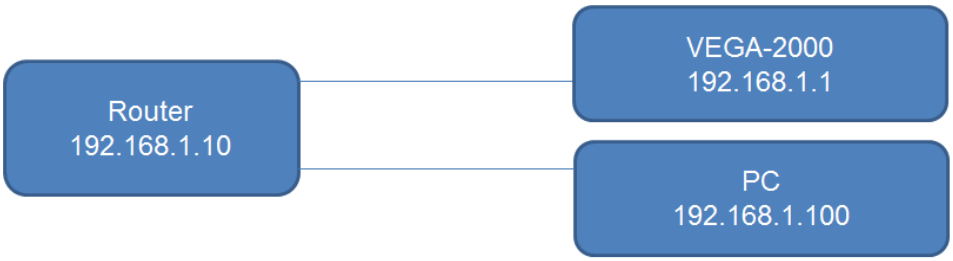
4.4 HTTP Live Streaming

HTTP Live Streaming (HLS) is an HTTP-based media streaming communications protocol implemented by Apple Inc. as part of its QuickTime, Safari, OS X, and iOS software. It works by breaking the overall stream into a sequence of small HTTP-based file downloads, each download loading one short chunk of an overall potentially unbounded transport stream.
[NOTE] No support hevc in flv only support H264.

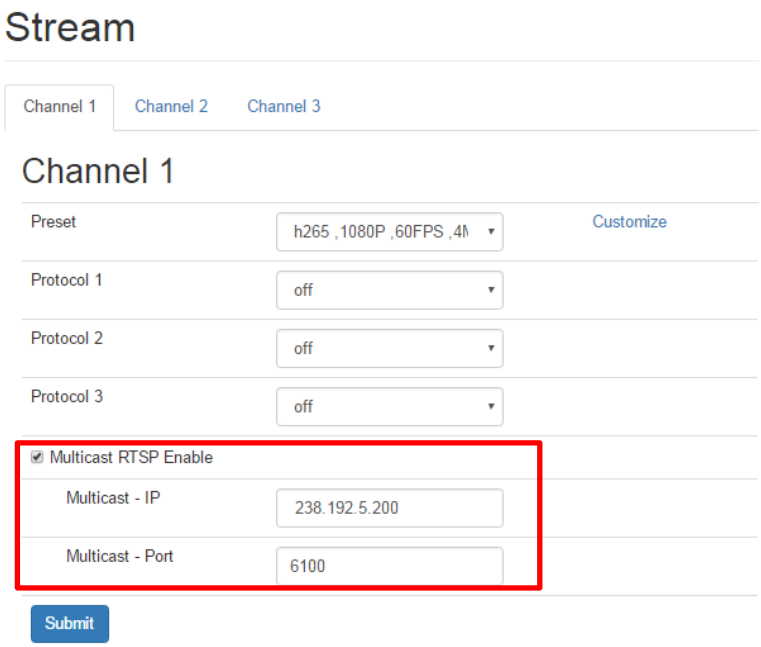
1. Use this URL to open HLS http://192.168.1.10/hls/channel1.m3u8 on iOS.
2. You can get HLS.

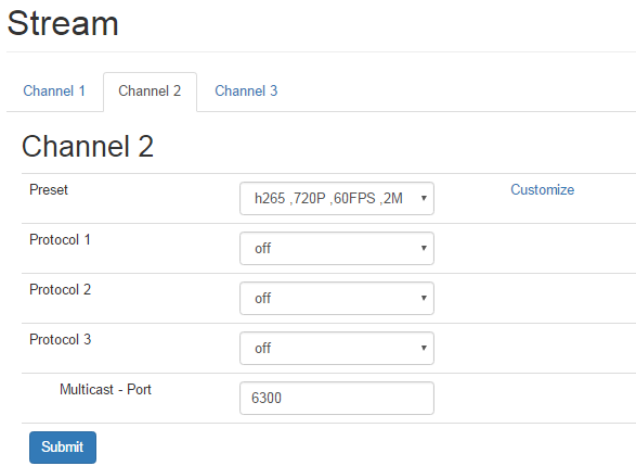
4.5 RTSP multicast streaming

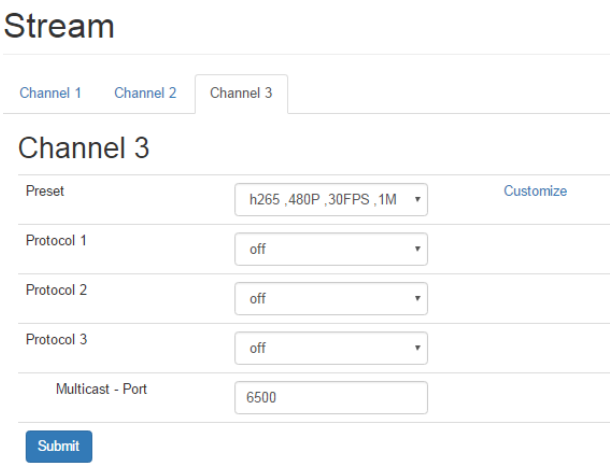
This section shows how to receive RTSP multicast streaming with VLC. Please make sure that SDI / HDMI source is connected to VEGA-2000(M) correctly before starting.



1. Turn on router(enable DHCP).
2. PC network cable connects to the router.
3. VEGA-2000(M) network cable connects to the router.
4. Turn on the PC.
5. Turn on the VEGA-2000(M).
6. Get the VEGA-2000(M) IP address is 192.168.1.1.
7. Enable multicast and set multicast address to 238.192.5.200, multicast port (channel1=61000, channel2=63000,channel3=65000)





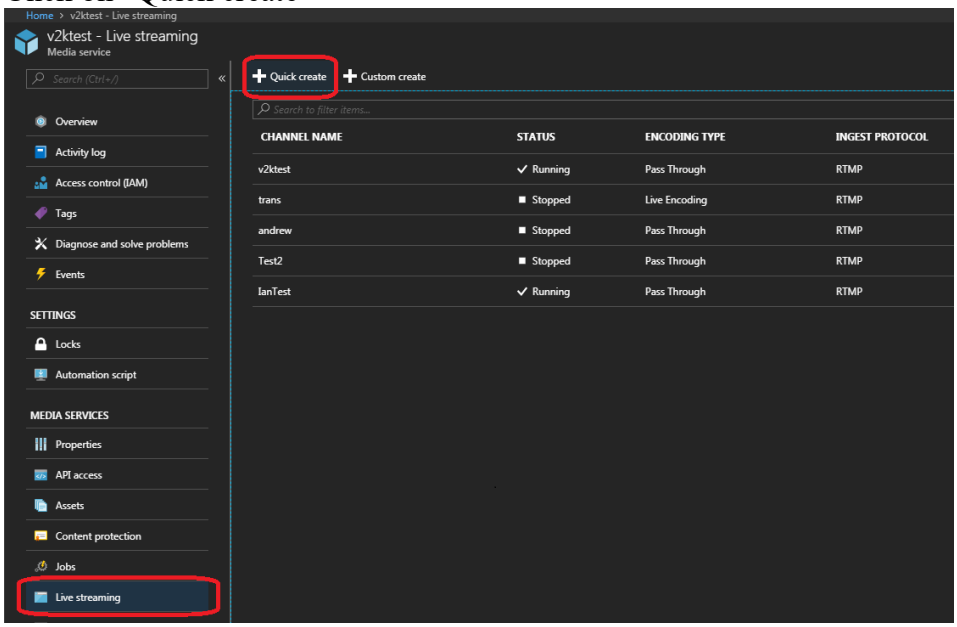


8. Open Network Stream from VideoLAN VLC media player and enter URL “rtsp://192.168.1.1:8554/channel1”, click "Show more options" and enter ***:rtsp-mcast*** in "Edit Options", Play.

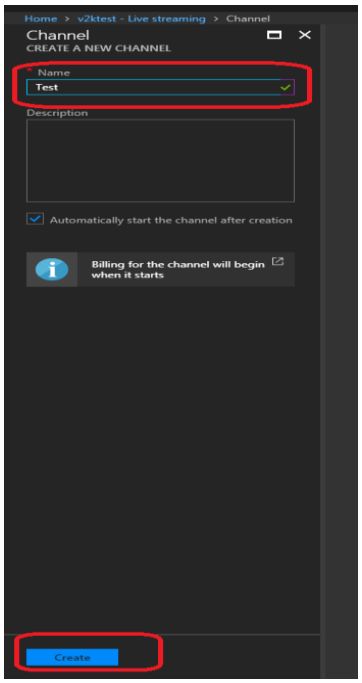
4.6 Multi-bitrate Streaming to Microsoft Azure

Microsoft Azure Setup

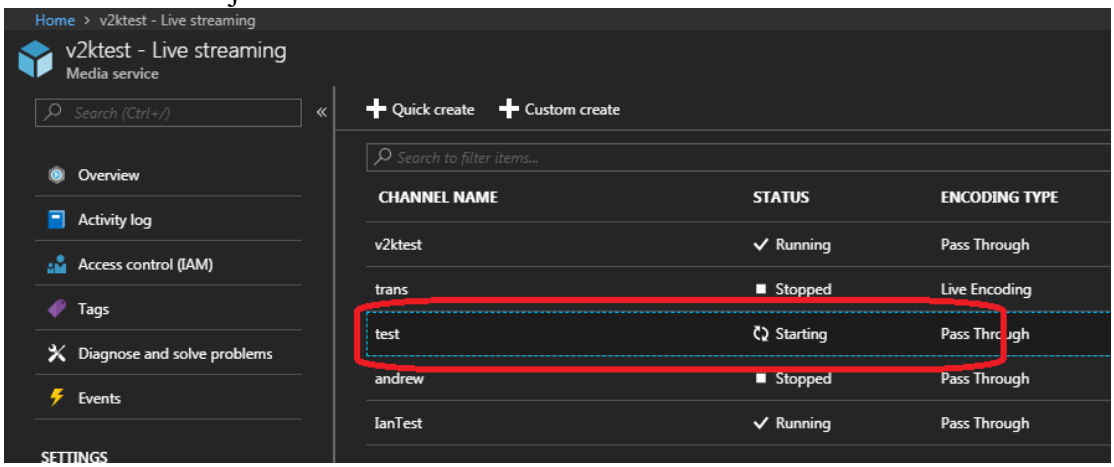
1. Create new live streaming
   Click on “Quick create”



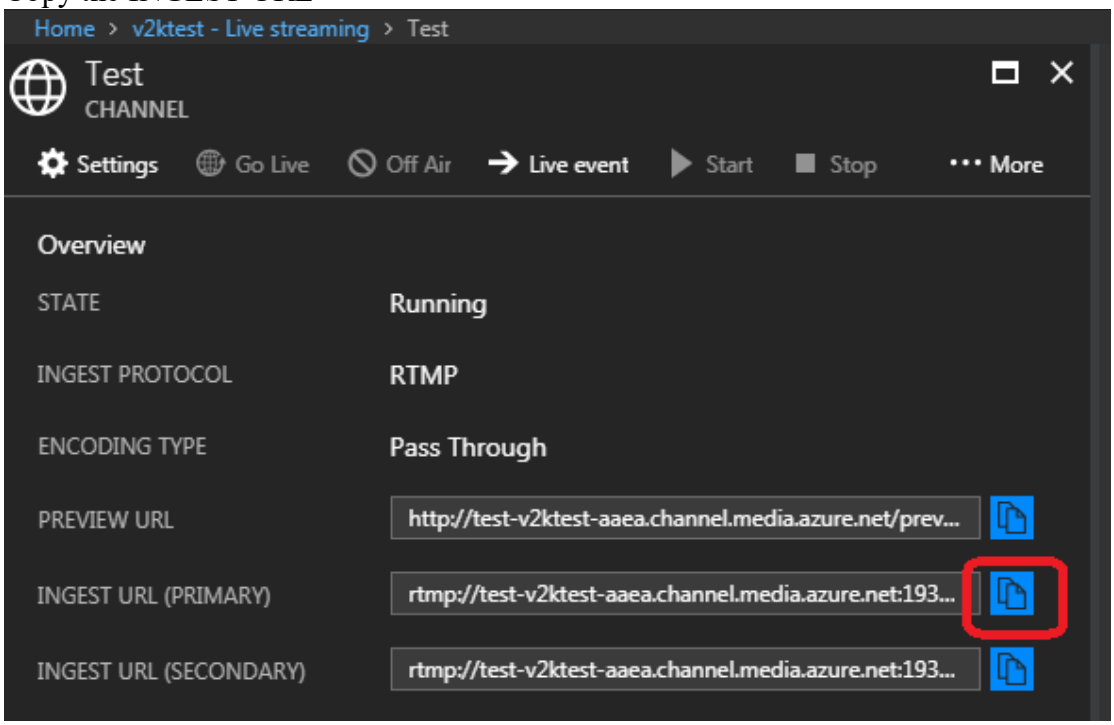
2. Create a name and click on create



3. Select the stream just created

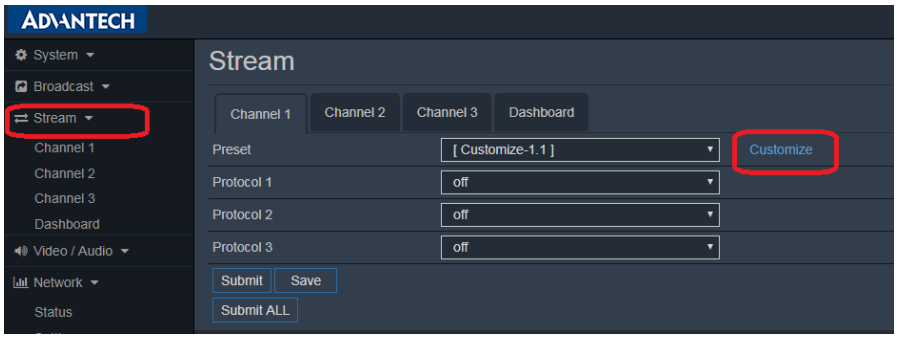


4. Copy the INGEST URL



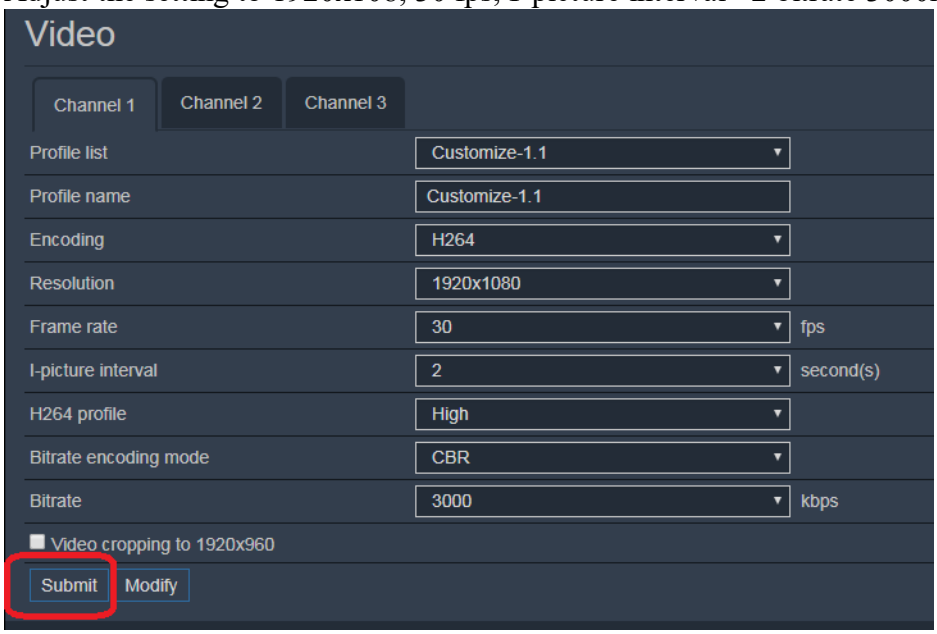
VEGA-2000/VEGA-2000M setup

1. Select Stream –Channel1 Customize

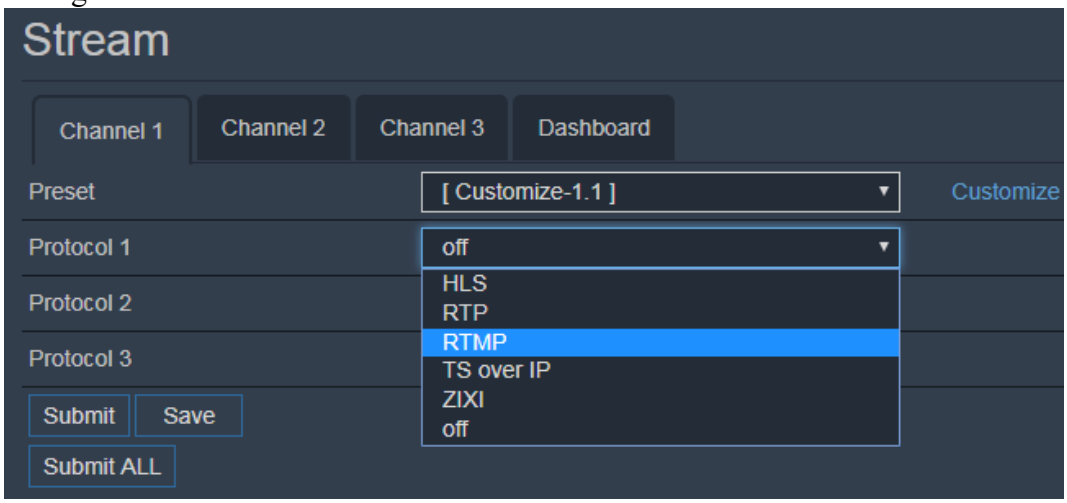


Note: For multi-bitrate operation, all the video will be align with channel1; therefore, channel cannot be blank.

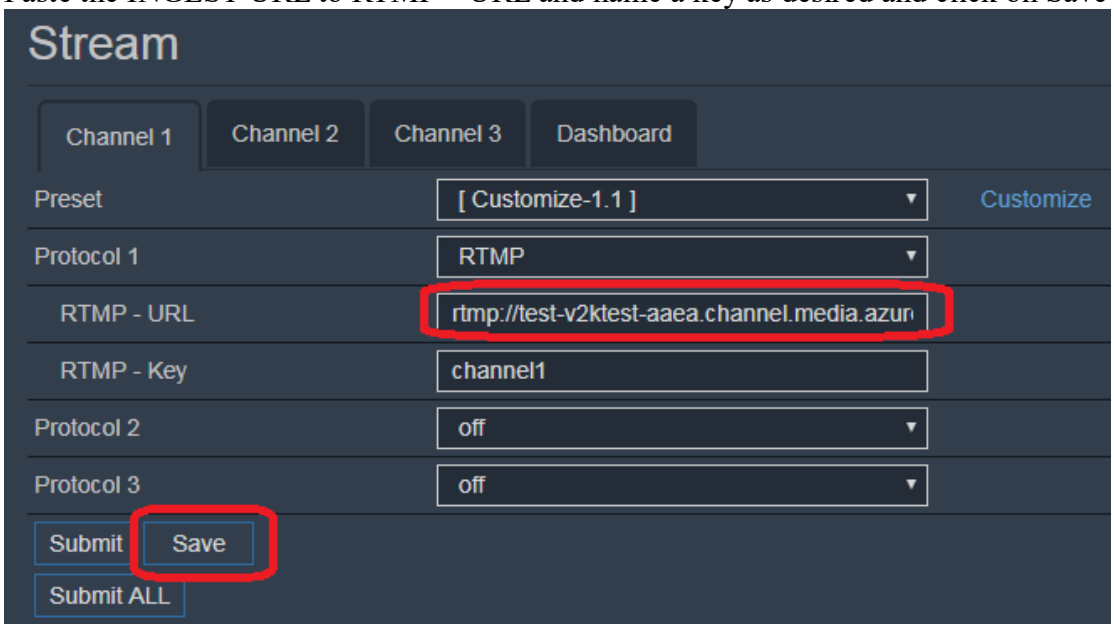
2. Adjust the setting to 1920x108, 30 fps, I-picture interval =2 bitrate 3000kbps and click on submit



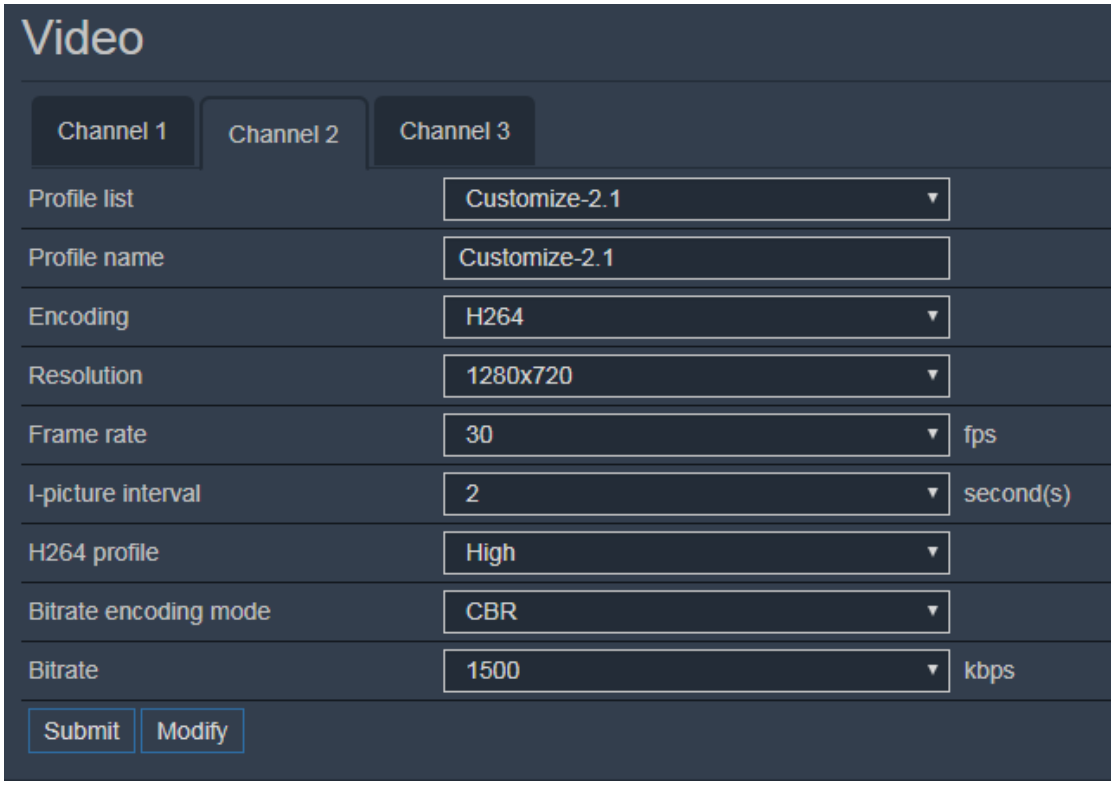
3. Change Protocol 1 to RTMP



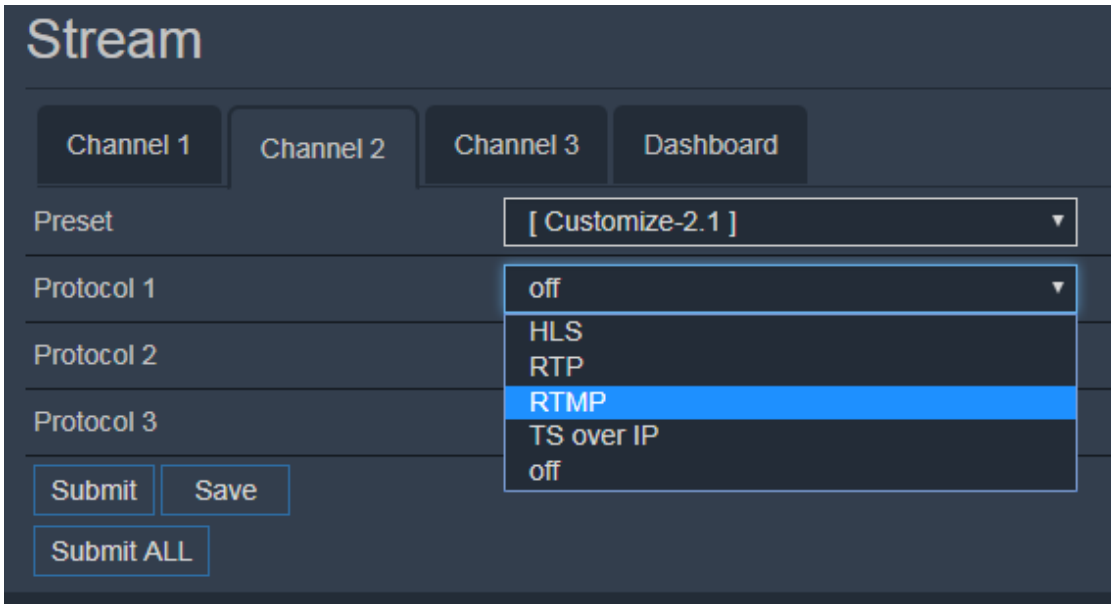
4. Paste the INGEST URL to RTMP – URL and name a key as desired and click on Save



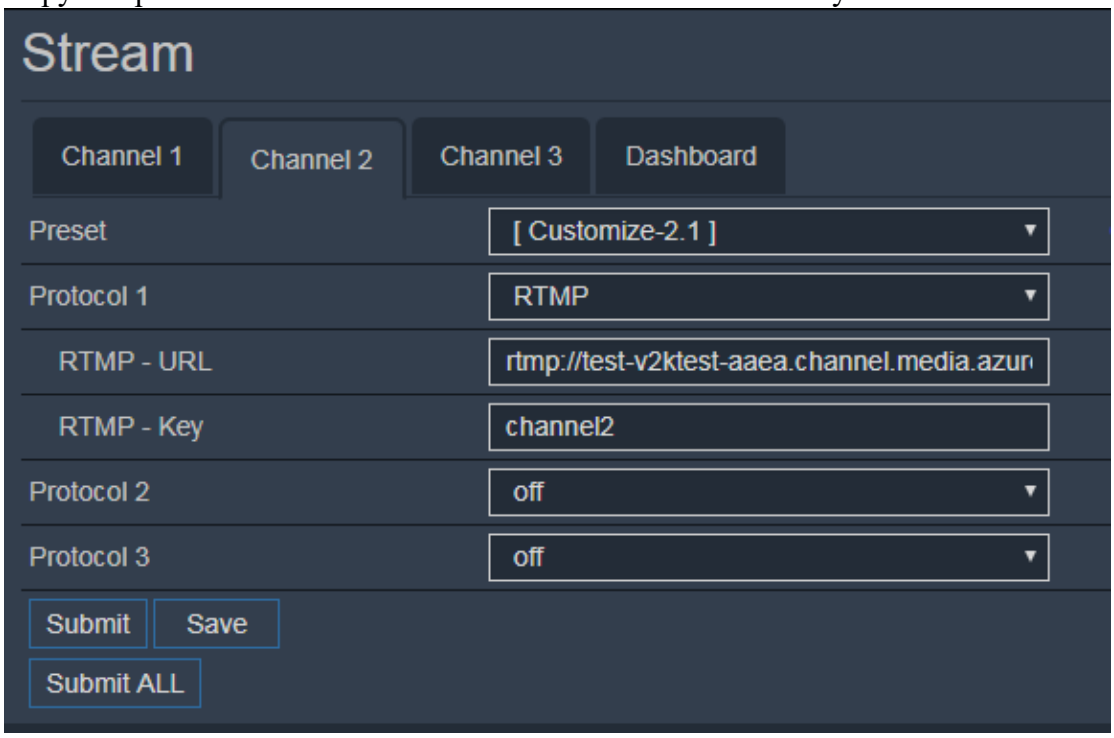
5. Select Channel 2 and customize to 1280x720, 30 fps, I-picture interval 2, bitrate 1500 kbps and submit.



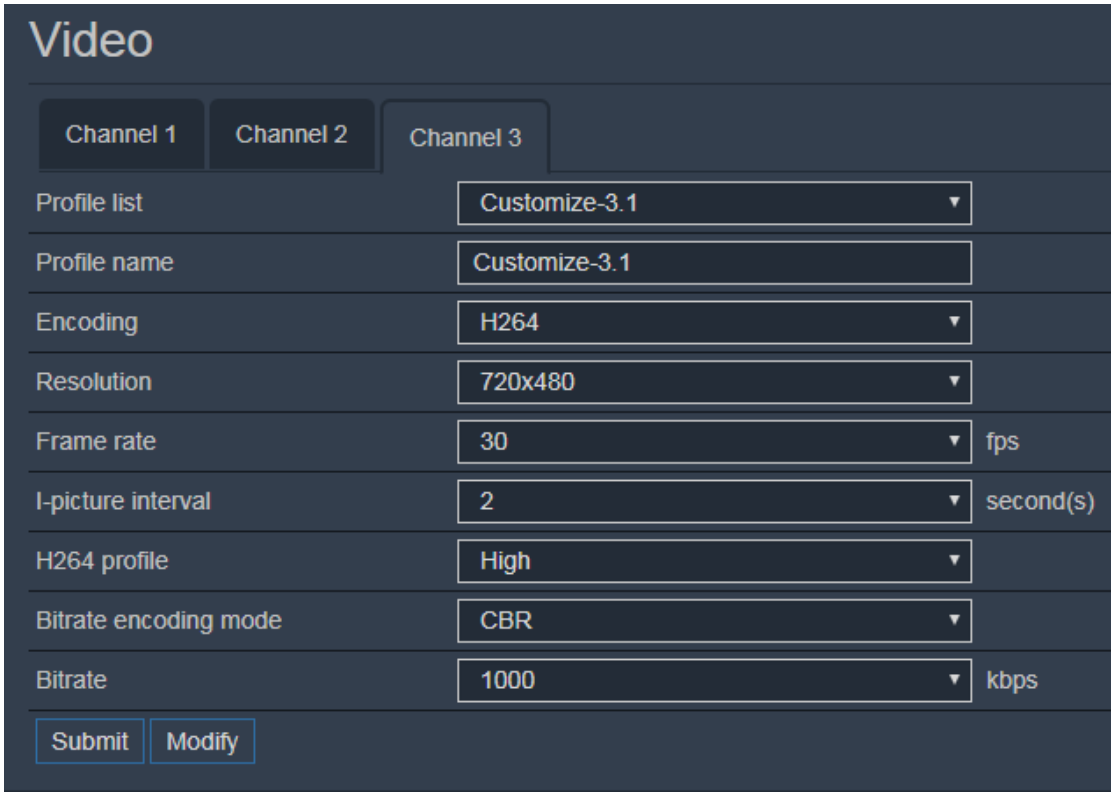
6. Select RTMP in Protocol 1



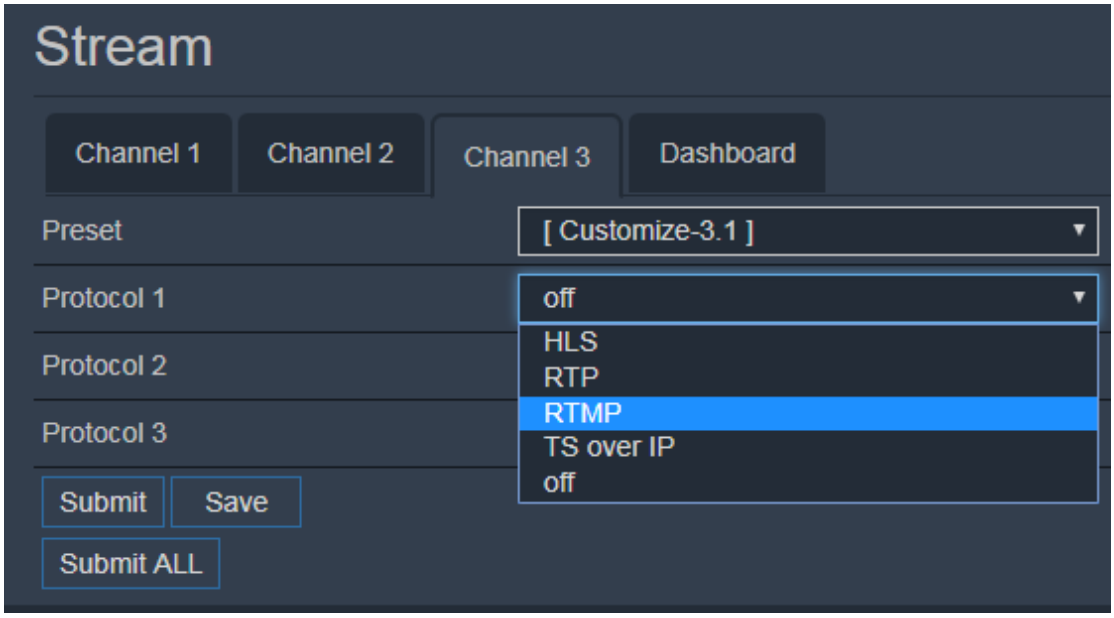
7. Copy and paste the INGEST URL to RTMP-URL and name a key as desired and click on Save



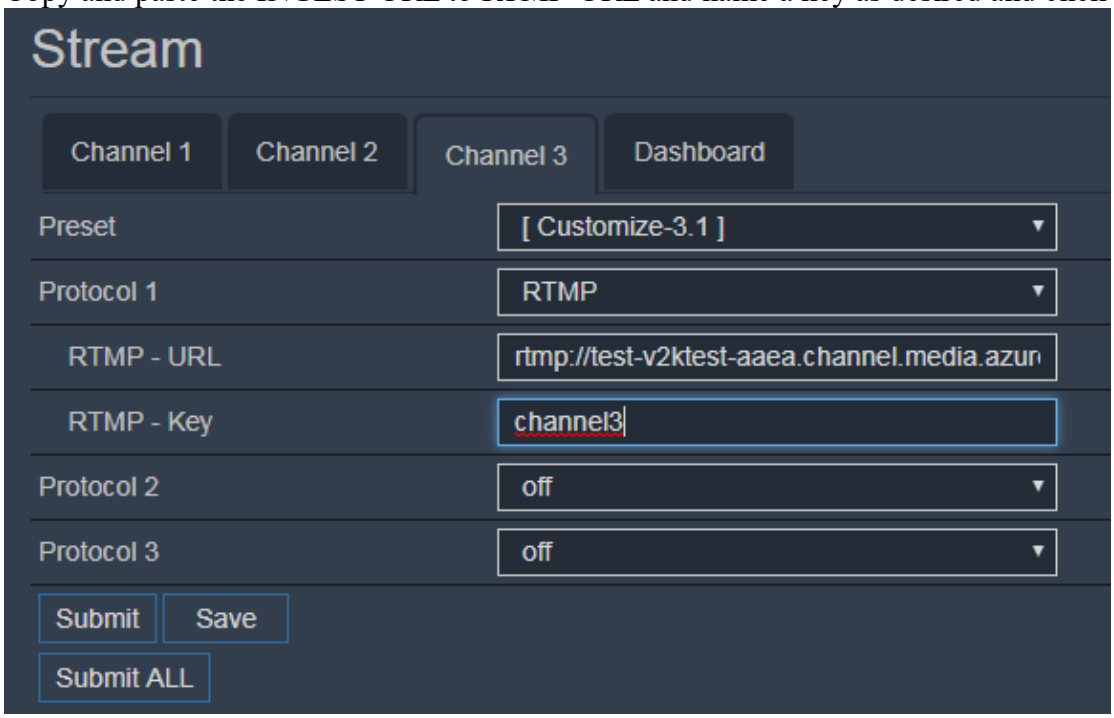
8. Select Channel 3 and customize to 720x480, 30 fps, I-picture interval 2, bitrate 1000 kbps and submit.



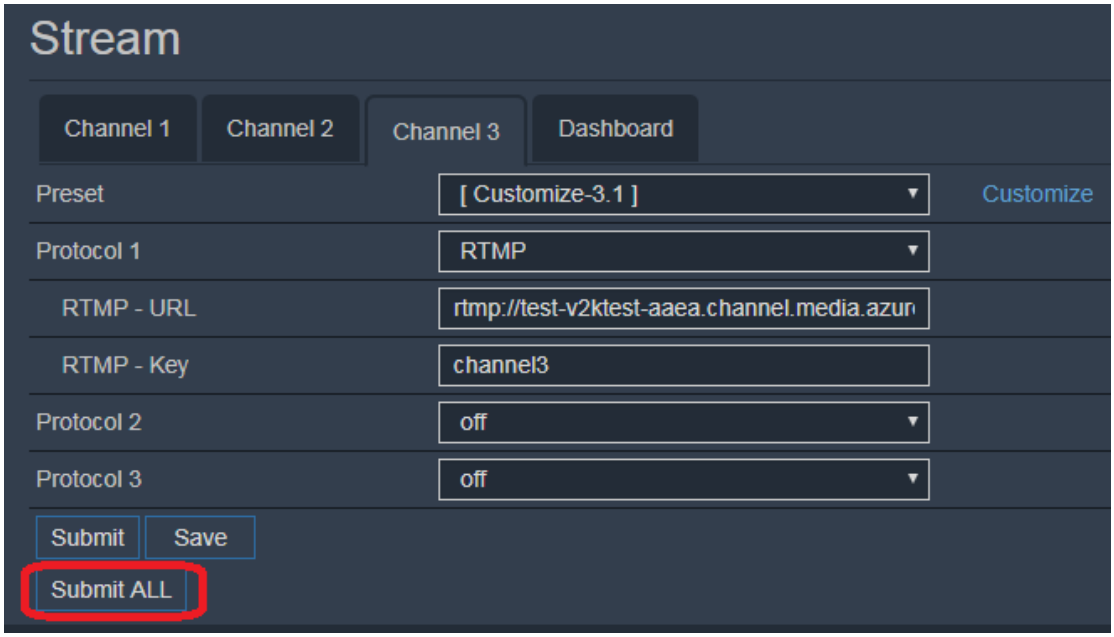
9. Select RTMP in Protocol 1



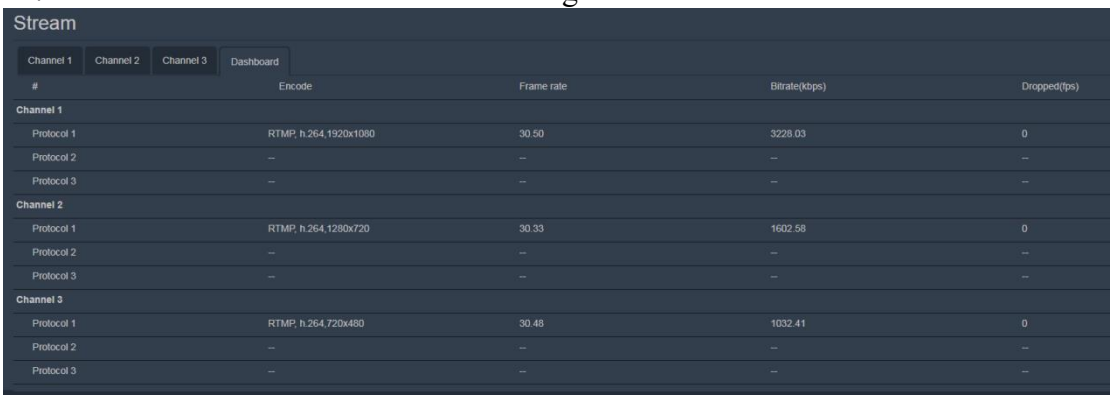
10. Copy and paste the INGEST URL to RTMP-URL and name a key as desired and click on Save



11. Click on Submit ALL



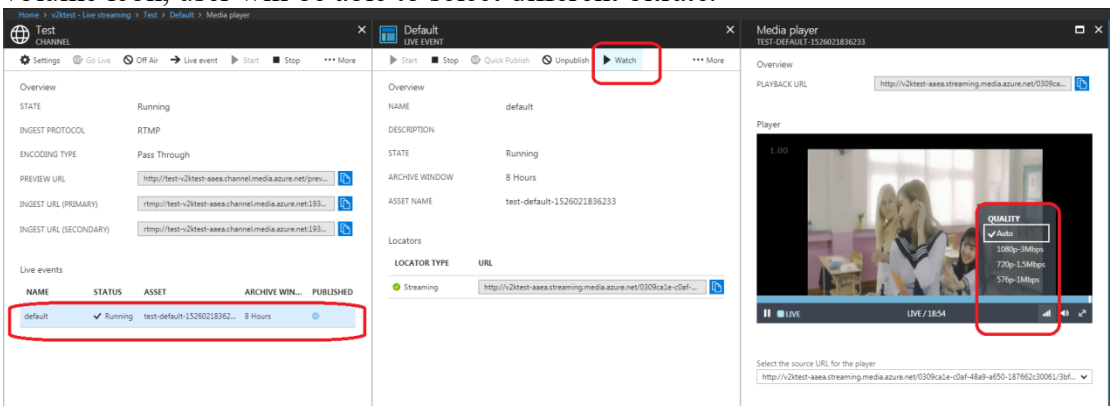
12. Check Dashboard if all streams are being send.



Note: The maximum bit rate for each event is 25Mb, if the total bitrate is over 25Mb, some streams may not be able to reach Azure sever.

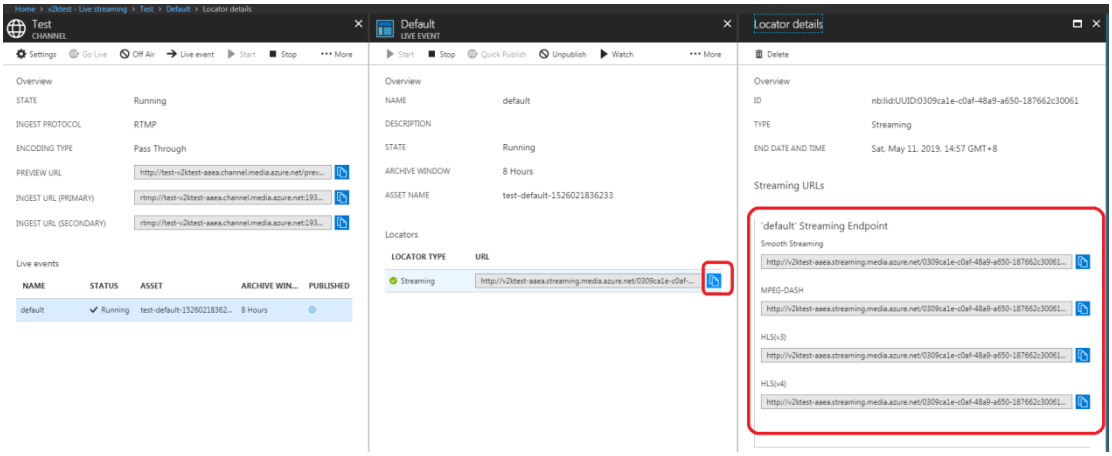
Watch Streaming

User will be able to watch the stream by click on the event and click on the Watch icon. Moving to the volume icon, user will be able to select different bitrate.



Note: sometimes the watch icon will be grey out, please refresh the whole webpage again.

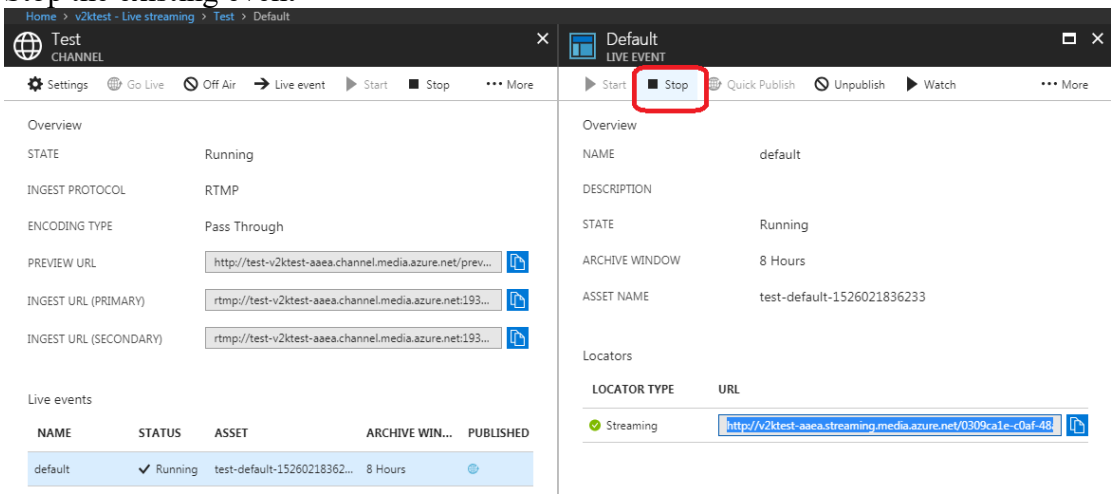
User will be able to watch the video from other player by copying the URL provided by Azure.



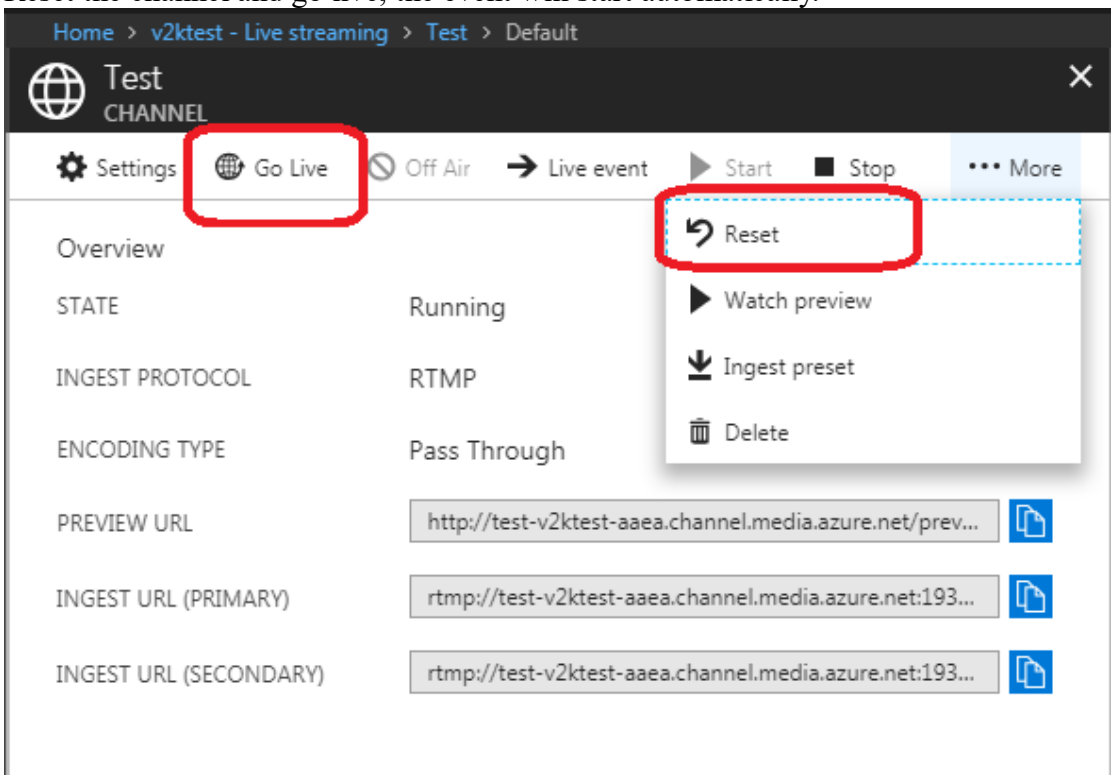
Reset Channel

It is required to reset Azure channel when re-sending stream from VEGA-2000/VEGA-200M.

1. Stop the existing event



2. Reset the channel and go live, the event will start automatically.

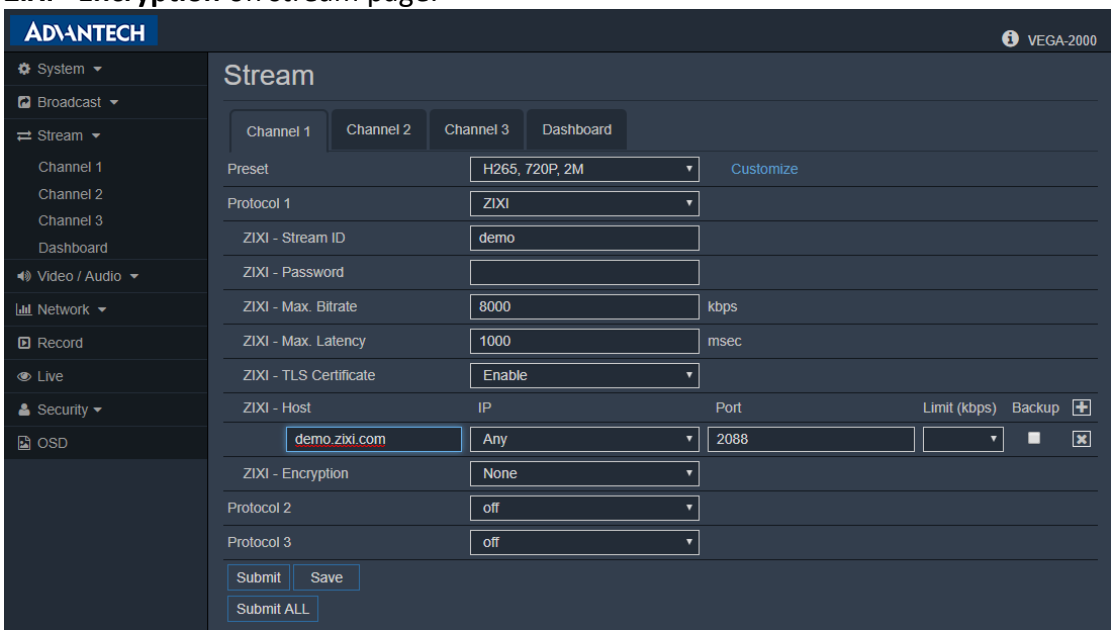


3. Go through VEGA-2000 setup process again. If the user has already completed the setup process, simply click on submit all again.

4.7 Streaming to ZIXI

VEGA-2000/VEGA-2000M setup

1. Set **ZIXI, ZIXI - Stream ID, ZIXI - Max. Bitrate, ZIXI - Max. Latency, ZIXI - TLS Certificate, ZIXI - Host, ZIXI - Encryption** on stream page.



Note:
VEGA-2000/VEGA-2000M only support 720P for ZIXI.
VEGA-2000/VEGA-2000M support ZIXI on channel 1 and protocol 1.

VLC setup

2. If user VLC as receiver, install VLC plugin '**zixi_vlc_plugin-win32-1.11-latest.zip**' on Windows. (support VLC version 2.2.x)
3. Run VLC and open the '**Media**' menu
   Select '**Stream**' to open launch the '**Open Media**' window
   Select '**Network**', fill in '**zixi://demo.zixi.com/demo**' as ZIXI host URL.

Appendix A: Hardware/Software Support List

A1. Hardware support list

Input selection	mode	Status	A102 Board
3G SDI	1ch	Supported	V
HDMI	1ch	Supported	V
Audio phone jack	1ch	Supported	V

A2. VEGA2000(M) video encoding performance

◎ Input source：1080p 60

	Channel1 (H265) : 6M	Channel2 (H265) :3M	Channel3 (H265) : 1.5M
1 streaming	1920x1080 (60fps)	X	X
2 streaming	1920x1080 (60fps)	1024x576 (60fps)	X
2 streaming	1920x1080 (60fps)	1280x720 (30fps)	X
3 streaming	1920x1080 (30fps)	1280x720 (30fps)	720x480 (30fps)

◎ Input source：1080p 50

	Channel1 (H265) : 6M	Channel2 (H265) :3M	Channel3 (H265) : 1.5M
1 streaming	1920x1080 (50fps)	X	X
2 streaming	1920x1080 (50fps)	1280x720 (50fps)	X
3 streaming	1920x1080 (50fps)	1280x720 (30fps)	720x480 (30fps)

◎ Input source：720p 60

	Channel1 (H265) : 6M	Channel2 (H265) :3M	Channel3 (H265) : 1.5M
1 streaming	1280x720 (60fps)	X	X
2 streaming	1280x720 (60fps)	1280x720 (30fps)	X
3 streaming	1280x720 (60fps)	1280x720 (30fps)	720x480 (30fps)

◎ Input source：720p 50

	Channel1 (H265) : 6M	Channel2 (H265) :3M	Channel3 (H265) : 1.5M
1 streaming	1280x720 (50fps)	X	X
2 streaming	1280x720 (50fps)	1280x720 (50fps)	X
3 streaming	1280x720 (30fps)	1280x720 (30fps)	720x480 (30fps)

◎ Input source：1080p 60

	Channel1 (H264) : 6M	Channel2 (H264) :3M	Channel3 (H264) : 1.5M
1 streaming	1920x1080 (60fps)	X	X
2 streaming	1920x1080 (60fps)	1024x576 (60fps)	X
2 streaming	1920x1080 (60fps)	1280x720 (30fps)	X
3 streaming	1920x1080 (30fps)	1280x720 (30fps)	720x480 (30fps)

◎ Input source：1080p 50

	Channel1 (H264) : 6M	Channel2 (H264) :3M	Channel3 (H264) : 1.5M
1 streaming	1920x1080 (50fps)	X	X
2 streaming	1920x1080 (50fps)	1280x720 (50fps)	X
3 streaming	1920x1080 (50fps)	1280x720 (50fps)	720x480 (30fps)

◎ Input source：720p 60

	Channel1 (H264) : 6M	Channel2 (H264) :3M	Channel3 (H264) : 1.5M
1 streaming	1280x720 (60fps)	X	X
2 streaming	1280x720 (60fps)	1280x720 (60fps)	X
3 streaming	1280x720 (60fps)	1280x720 (60fps)	640x480 (30fps)

◎ Input source：720p 50

	Channel1 (H264) : 6M	Channel2 (H264) :3M	Channel3 (H264) : 1.5M
1 streaming	1280x720 (50fps)	X	X
2 streaming	1280x720 (50fps)	1280x720 (50fps)	X
3 streaming	1280x720 (50fps)	1280x720 (50fps)	640x480 (50fps)

A3. Software release schedule

Release Version	Release Date	Feature Set
Alpha	10.30.2015	firmware update to iNand by USB (redundant)
		Video input (HDMI and SDI, progressive 1080p only)
		HEVC streaming and recording to mp4, simple encode setting
		Network control at bootup, dhcp/static IP
		Simple guide
0.1	12.14.2015	Video input (progressive 1080p & 720p)
		HEVC and H264 triple encoding (system encoder capability define)
		encode setting for multiple stream
		Multi RTSP streaming
1.0	1.29.2016	Triple recording
		AAC audio streaming
		Streaming AV sync
		New Web layout
		Wireless dongle AP mode support (RTL8188/8192 series and RTL8812AU)
		CGI API document
1.1	2.29.2016	Recording AV sync
		Capturing still image support
1.2	5.10.2016	TS over IP (Unicast)
		CGI command to check Wifi dongle
		QoS (RTSP only)
		Multi stream audio
		Bugs fix
2.0	07.29.2016	HLS
		RTMP (to Youtube/Facebook)
		Streaming GUI with encode preset
		Bugs fix
2.1	10.07.2016	LTE dongle support
		RTSP multicast
		Interlaced input video support
2.2	11.30.2016	Logo insertion
		NTP
		HDMI out for VEGA-2000M
2.3	3.15.2017	WIFI EP mode

		HDMI audio
		Streaming Status (Web/CGI)
		Upgrade Issue fix
2.4	8.8.2017	UPnP
		NetBios
		Dashboard for showing all streaming status
		Add Boardcast Page
		Setup DNS
		Setup priority for network device
		Reconnect automatically for RTMP.
2.5	1.18.2018	HLS supports FMP4
		MPEG-2 TS/RTP Compatibility with Elemental Live
		RTMP Compatibility with Azure rtmp server
		Implement security related functions
		Apple HLS streams to a video server
		Snapshot in Live page

Note that dates and contents of individual releases can change without notice

A4. Supported Wireless dongle list

Vendor	Model Name
Realtek	RTL8188CUS RTL8188RU RTL8188CUS-Slim Solo RTL8188CUS-Slim Combo RTL8188CE-VAU RTL8188CUS-VL RTL8188CTV RTL8192CUS RTL8192CE-VAU RTL8812AU

[NOTE]
Only these are officially supported by VEGA-2000(M).