TVU networks

TVU Grid™

TVU Grid Feature List

Version 2.0

Unlimited Scalability for Video Distribution

- ➢ **Simple Operation**
    - ○ Once a Grid source is available to a user, the user can take it live the same way how a TVUPack live transmission is started.
    - ○ Live Grid transmission operation can be managed from either the Transceiver GUI or the Command Center.
    - ○ Dynamic mode allows the Grid system to choose the optimal latency based on the network condition.
    - ○ Manual mode allows the user to set their own preferred latency (down to as low as sub-second) and the latency never changes.

- ➢ **Low Network Bandwidth Requirement**
    - ○ For SD content, Grid encodes it at 2.5Mbps by default and it's configurable.
    - ○ For HD content, Grid encodes it at 8Mbps by default and it's also configurable.
    - ○ Each transceiver only requires to transmit one copy of the Grid stream.
    - ○ To share HD content, each transceiver only requires 8Mbps of bandwidth + approximately 5% overhead for FEC.
    - ○ To share SD content, each transceiver only requires 2.5Mbps of bandwidth + approximately 5% overhead for FEC.

- ➢ **Extremely Efficient FEC Transmission Algorithm: IS+**
    - ○ TVU proprietary transmission algorithm IS+ is applied on Grid.
    - ○ Grid transmission can be achieved in the dirty shared public network.
    - ○ Sub-second transmission latency can be consistently achieved for most of the Grid transmissions.

- ➢ **Grid Source Can be from Anywhere**
    - ○ Most commonly a TVUPack source can be converted to Grid.
    - ○ A local SDI feed can be plugged into a transceiver and converted to Grid.
    - ○ YouTube videos can be added as external sources and then converted to Grid.
    - ○ Any type of IP-based cameras or encoders can stream to transceiver for decoding and then be converted to Grid.

- ➢ **Support Closed Captioning CEA 708 and OP-47**
    - ○ CC information will be carried over throughout the entire Grid ecosystem, from the origin to the destination.
    - ○ If CC does not exist in the source, it can be generated with the help of the Live Transcription feature on the Transceiver.

- ➢ **Support up to 8 Audio Channels**
    - ○ Up to 8 audio channels can be carried in each Grid stream.
    - ○ The number of audio channels is configurable.
    - ○ Audio Encoding Bitrate is configurable.

- ➢ **Self-triggered Pairing and Authorization**
    - ○ Routing a Grid stream from one location to another may require preauthorization and pairing.
    - ○ Calling TVU Support can get this done in a timely fashion.
    - ○ Grid users are allowed to authorize the Grid routing and distribution through the Grid Marketplace.

- ➢ **H.264 and (Optional) H.265/HEVC Encoding**
    - ○ H.264-based Grid Encoder encodes HD at 8Mbps and SD at 2.5Mbps.
    - ○ H.265-based Grid Encoder is capable of encoding HD at 5Mbps while maintaining similar picture quality as H.264 at 8Mbps.

- ➢ **Metadata**
    - ○ Metadata information is carried over through the Grid Ecosystem.
    - ○ Grid users are free to add metadata for their Grid streams on the Command Center.
    - ○ Metadata can also be generated with the help of the TVU AI.

- ➢ **Grid Map View**
    - ○ TVU Grid automatically detects the geolocation of a Grid source and a receiver.
    - ○ In case of a virtual network, there's an option for the Grid users to manually set the geolocation of a Grid source or a receiver.
    - ○ All Grid devices can be displayed on a map for better visual effects.

- ➢ **Frame Accurate Switch**
    - ○ Option to support seamless switch between the Grid streams on the transceiver.
    - ○ No black screen during switching
    - ○ Switching accuracy is down to frames.

- ➢ **Live Grid Video Monitoring (Multiview)**
    - ○ The Command Center provides "multiview" for live Grid video monitoring.
    - ○ Ultra-low latency between the video source and the multiview display.

- ➢ **Hot Failover**
    - ○ In case of unfortunate event, a fallback routing can be automatically established within seconds of failure of the primary routing to make sure Grid content be delivered to the desired destination.
    - ○ Optimal routing will be assigned automatically by the Grid Controller Service regardless where the Grid devices are on the globe.

- ➢ **Grid Booking Service**

- ○ The Command Center allows the Grid users to book or schedule future Grid transmissions from any source to any destination within the user rights.
  - ○ Grid transmission latency can be predetermined during the booking process and can be changed anytime. Dynamic mode is also readily available for booking.
  - ○ Booking schedules can be viewed either on the Command Center or more specifically on the destination transceiver.

- ➢ **Grid Data Usage**
  - ○ Grid data usage can be viewed on TVU Analytics(a.k.a Dashboard).
  - ○ Each Grid transmission is recorded, including the source, the destination, software version numbers, the starting time and the total live time.

- ➢ **Grid API**
  - ○ Grid API can be provided for those who want to integrate Grid into their own management system or web portals.
  - ○ Detailed API Document is available for all users of interests.
  - ○ Secure user account and device protection is provided for API calling.

- ➢ **Unlimited Scalability**
  - ○ Grid Service is hosted in TVU data center and AWS servers all over the world.
  - ○ No matter how many places a Grid stream needs to be distributed to, TVU Grid can efficiently and effectively route the content to the destination with the lowest possible delay.

- ➢ **AES-256 Encryption**
- ➢ **Embargo**
- ➢ **TVU Voice**
- ➢ **TVU Grid Alert**
- ➢ **SRT and SMTE2110 IO support**