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To: "Anil Kumar" <advbcs-2@trai.gov.in>, "V.K. Aggarwal" <jtadvbcs-1@trai.gov.in>
Sent: Tuesday, September 26, 2023 2:57:32 PM
Subject: Consultation Paper on Review of Regulatory Framework for Broadcasting and Cable services

Dear Shri Bhardwaj,

I am Joydip Kapadia, the CEO of New Age Channel Mapping LLP, a company specializing in channel mapping, distribution strategies, and analytics. I have over 14 years of experience in audience measurement, having worked with INTAM and TAM. My partner, John Bosco, brings in more than 25 years of experience in channel distribution, collaborating with renowned broadcasters throughout his career.

Typically, broadcasters uplink TV channels at a bitrate ranging from 2.5 to 3 Mbps, which are then downlinked by Distribution Platform Operators (DPOs). These channels pass through encoders where bandwidth allocation in Mbps is assigned to each channel. Each encoder typically has a bandwidth capacity of approximately 36 to 40 Mbps. According to the DVB consortium, it is recommended to allocate 12 to 13 channels per encoder, with each channel receiving a decent 2.5 to 3 Mbps of bandwidth. This straightforward logic enables the calculation of the DPO's network capacity as the sum of the bitrates of all channels provided by the DPO.

This calculation serves two primary purposes:

1. Determining the average bitrate at which the DPO delivers channels. Hence determining the QOS provided.
2. Identifying the number of encoders used by the DPO for channel delivery.

It's important to note that some DPOs may attempt to fit as many as 20 channels per encoder (resulting in an average bitrate of 1.8 Mbps per channel), potentially compromising the audio and video quality delivered to subscribers. Lower bitrates are likely to result in below-average AV quality and pixelation when signal strength diminishes.

Bitrate delivery can occur in two forms: Constant Bitrate (CBR) and Variable Bitrate (VBR). Most DPOs opt for VBR, where the presence of a sports channel, for instance, can consume more bitrate compared to other genres, potentially affecting the quality of other channels on that encoder. In contrast, CBR channels have their bitrate fixed within a specific range (e.g., 2.5 to 3 Mbps), ensuring that it never drops below the lower limit or exceeds the upper limit.

Effective bitrate control and monitoring play a crucial role in delivering superior AV quality to subscribers.

In conclusion, DPOs carrying 400 SD channels should allocate a bandwidth of at least 2.5 Mbps per channel, resulting in a total of 1000 Mbps. This translates to the need for 1000 Mbps divided by 38 Mbps per encoder, which equals 26 encoders. Therefore, if a DPO is offering 400 channels, it should utilize no fewer than 26 encoders to maintain reasonable AV quality for subscribers. This formula can also be employed to assess network capacity, emphasizing that it should be based on the number of encoders utilized rather than the number of channels.

During a scan of the DPO feed at the user's end, one can obtain a list of all encoders along with their frequencies used by the DPO.

Average uplink bitrate for SD channels: 2.5 Mbps

Average uplink bitrate for HD channels: 5 Mbps

Consequently, 1 HD channel is equivalent to the bandwidth of 2 SD channels.

Regards