

# RIST MAIN PROFILE

The next evolution in transmission of streaming video over the Internet



**RIST Forum**



First released in October of 2018 with a limited feature set, the Reliable Internet Stream Transport (RIST) simple profile offered the first industry approach to a best-in-class live video and audio transport over the open Internet with minimal latency and high reliability. Today, many commercially available products using RIST exist in the marketplace. The next step in the evolution of streaming media transport is the upcoming release of the RIST Main Profile.

The Main Profile builds upon the features of the Simple Profile to provide backwards compatibility, while opening the door for full-scale adoption across the Internet. This paper will provide a sneak peak of the technology being considered for ratification by the RIST working group, as well as the applications behind why the technology is commercially viable.

## Considered Features

- Encryption (DTLS and PSK)
- Higher Bandwidth Services
- Enhanced Firewall Traversal
- Single Point-to-Multipoint Transmission
- Decreased Bandwidth Usage

## Use cases

### Live news gathering – securely and reliable from any location

A news reporter may be traveling anywhere in the world and would like to send a live transmission to the home studio from any location. With the use of a RIST-capable device, the reporter is able to connect to the home studio via a secure and encrypted DTLS link.

The RIST device will “call home” to a predesignated IP address and port in the home studio. The reporter’s credentials will be verified and authenticated, and once that happens a live streaming session will commence. The ARQ (retransmission) technique described already in the RIST Simple Profile will ensure that the stream is free from impairments no matter the network quality.

Additionally, bonding is also natively supported and allows the reporter to use multiple internet connections (e.g. 3G/4G/5G, WiFi, Ka satellites) to “call home” to the home studio and for a combined higher bitrate or for protection against link failures.

## Live ingest into public cloud – now over public Internet

With live applications such as playout and news production moving into public cloud, reliably getting live content into these environments become a crucial challenge to solve. Using the RIST ARQ (retransmission) capabilities described in the RIST Simple Profile broadcast quality live content can be streamed into public cloud environments using standard IT-grade leased lines, such as AWS Direct Connect or Microsoft Azure ExpressRoute. Securing content using the DTLS (or PSK) encryption capabilities from the upcoming RIST Main Profile allows live ingest use cases to use the public internet rather than dedicated leased lines into public cloud environments, while still keeping the live stream secure from eavesdropping. With native support for authenticating the receiver you can be sure that your content is only ever sent to the expected receiver and not any impersonators.

## Affiliate multicast distribution – secured by encryption

Affiliate distribution has historically been done by multicasting the same video feed to several affiliates using satellite. The drive to replace satellite links with Internet connectivity has led broadcasters to look for alternatives that support simple multicast setups while still securing their content. A broadcaster wishing to replace satellite distribution to affiliates can now use the RIST Main Profile encryption capabilities to stream encrypted content to multiple RIST receivers. Each receiver will first “call home” to a central server to indicate that I’d like to receive the stream and may then connect and disconnect from the stream at its own schedule. The RIST main profile also adds an option for the sender to initiate a connection. The latter is useful when important news events happen, allowing a central location to push breaking news to affiliate stations.

## Bidirectional remote interview using robo camera (pan-tilt-zoom, PTZ)

A bidirectional robo (pan-tilt-zoom) camera interview calls for multiple connections between two locations, for video, bidirectional audio and remote camera control. RIST Main Profile will unify all of these channels into a single tunnel to enable simpler setup of intermediate firewalls and NAT solutions, and offer better security. RIST Main Profile includes native tunneling that can be used to send any number of streams in any direction, using the same RIST protected IP tunnel. In addition to audio and video, the tunnels support any IP-based protocols between two RIST peers, making it suitable for camera control traffic. The tunnel’s bidirectional capabilities are a perfect solution for remote robo camera interview, where the remote operator can have two-way audio and full camera control.

## Reliable broadcast quality streaming over high speed IT-grade WAN links

While bandwidths on the public internet is typically restricted and demands video feeds to be heavily compressed, leased lines provide speeds in the 10s and 100s of Gigabits, enabling transport of lightly compressed or even uncompressed content over long distances. The most cost-efficient leased lines are enterprise-grade connections, running over standard IT equipment, with quality and SLAs designed to meet the need of office applications rather than broadcast quality media.

Using the ARQ (retransmission) capabilities of the RIST Simple Profile allows these simpler and

more cost-efficient links to be used also for broadcast quality media transport, by protecting the content against network impairments. But the RIST Simple Profile, based on standard RTP headers (with 16-bit sequence numbers), are severely limited for high bit-rate streaming over WAN links. As an example, at 1500 Mb/s (uncompressed HD), the maximum ARQ (retransmission) buffer is restricted to 0.46 seconds, effectively restricting RIST to be applied to links with less than 50ms one-way delay. This is clearly unsuitable for international WAN links.

The RIST Main Profile includes an RTP header extension which increases the sequence number size to 32-bits, and therefore increases the maximum size of retransmission buffers, and thus opens the door for higher bitrate streams, such as lightly compressed (e.g. JPEG 2000, Tico) and uncompressed video.

### **Reliable streaming over low bandwidth links – now with improved utilization**

Adding reliability to non-reliable links comes with a bandwidth penalty. ARQ (retransmission) technology uses additional bandwidth to resend lost information. On low-bandwidth links, adding protection using RIST or similar technologies has an obvious impact on the amount of content that can be carried.

RIST Main Profile adds null packet deletion capability, which removes null packets from the stream at the sender side and transparently reconstructs them at the receiving one. This typically saves 5% bandwidth, but in some cases (certain multi program transport streams) even saves up to 10-15%. This bandwidth can be re-used for error recovery, or, in a multi-stream scenario, it allows for additional content.

### **Native IP multicast tunneling**

RIST Main Profile can maintain traditional IP multicast data flows that are commonly used to distribute IP-based video content over IP/IT infrastructures in many organizations. RIST is designed to work over any unicast infrastructure, including the Internet where no native IP multicast traffic can be distributed. The GRE based tunnel (with or without encryption layer) allows for native multicast data delivery through the unicast RIST tunnel. The tunnel encapsulates the multicast stream and delivers it unchanged to the remote end, effectively enabling IP multicast distribution over unicast infrastructures like the Internet.

This enables extension of video workflows based on IP multicast over any type of infrastructure, including the Internet, making it even easier to introduce public infrastructure and the Internet into existing professional media workflows.

## **ABOUT RIST FORUM**

The RIST Forum strives to make the world adopt the RIST protocol for transporting live video over unmanaged networks. Set up as a collaborative, non-profit organization, the RIST Forum is a true community that's engaging both users and vendors of RIST technology and RIST products.