



## ToughStream™ Integration Frequently Asked Questions

### ***What is ToughStream?***

ToughStream is a solution designed specifically for operators who want to improve their customers' quality of experience. ToughStream prevents the visual and audio artifacts caused by disruptions in the delivery stream and presents to the consumer a perfect viewing experience.

### ***Who is Digital Fountain and what do you know about delivering high-quality video?***

As experts in broadcast and real-time data transport, Digital Fountain software optimizes the delivery of digital media over any network. Our technology eliminates the common limitations associated with digital media distribution solutions over both private and public networks, maximizing our customers' existing infrastructure investments, and enabling expanded revenue opportunities.

DF Raptor™ technology redefines the science of forward error correction (FEC) by offering a universal solution that can accommodate an unlimited range of network conditions. Digital Fountain technologies are used today by leading mobile carriers, IPTV providers, and national defense agencies throughout the world and have been standardized by leading international standards bodies, including DVB, 3GPP, and IETF.

### ***Our network experiences very low average levels of packet loss; why do I need ToughStream?***

Considering that any loss event will be visible to a viewer, every event should be understood and addressed. Typically, loss events are measured in terms of an average over a long sample period. Many standards bodies recommend no more than one artifact per hour, for a mean time between artifacts (MTBA) of at least 4 hours. However, reporting loss this way will mask the actual impact on your viewers and your service's quality reputation. If issues occur during the 2am-4am hours, few viewers would be impacted and no downside is expected. But in-field measurements have shown that a majority of issues occur during peak viewing times (early morning and evening) amplifying the effect. Further, viewers have been trained to expect "perfect" TV video quality all of the time. While an issue occurring on average once per hour may seem reasonable, if all 24 events in a day occur in the same peak viewing session, viewers will take notice, and your call center will, too.

ToughStream protects against all types of loss resulting in a perfect video signal being delivered to the subscriber.

### ***Why should we be concerned about random loss events on our network?***

Any random problem caused by packet loss, a delayed packet, or an out of order packet will affect customer satisfaction and therefore your bottom line. An Accenture report found quality to be the leading obstacle to IPTV adoption, and another report by MRG claims 77% of operators' IPTV churn was attributed to service quality problems. It has been consistently

reported that an IPTV service that is not of acceptable quality will cause a customer to question their choice of provider for all services (video, data, voice, and mobile) and may lead to deeper dissatisfaction for products across the whole portfolio.

### ***We already use FEC in our network; why would I add ToughStream?***

ToughStream helps to overcome many of the issues that are plaguing FEC solutions that are currently deployed today. Physical layer FEC is used in all DSL environments; however, to support video traffic operators must add more protection by increasing interleaving depths or reducing code rates thus affecting all services going across the wire (voice, video, and data). Since ToughStream is an application layer FEC solution, it allows operators to reduce their physical layer FEC. Any resulting errors are repaired much more efficiently by ToughStream. By doing this, operators can decrease the latency for applications such as VoIP and gaming, yet maintain the highest quality transmission for video.

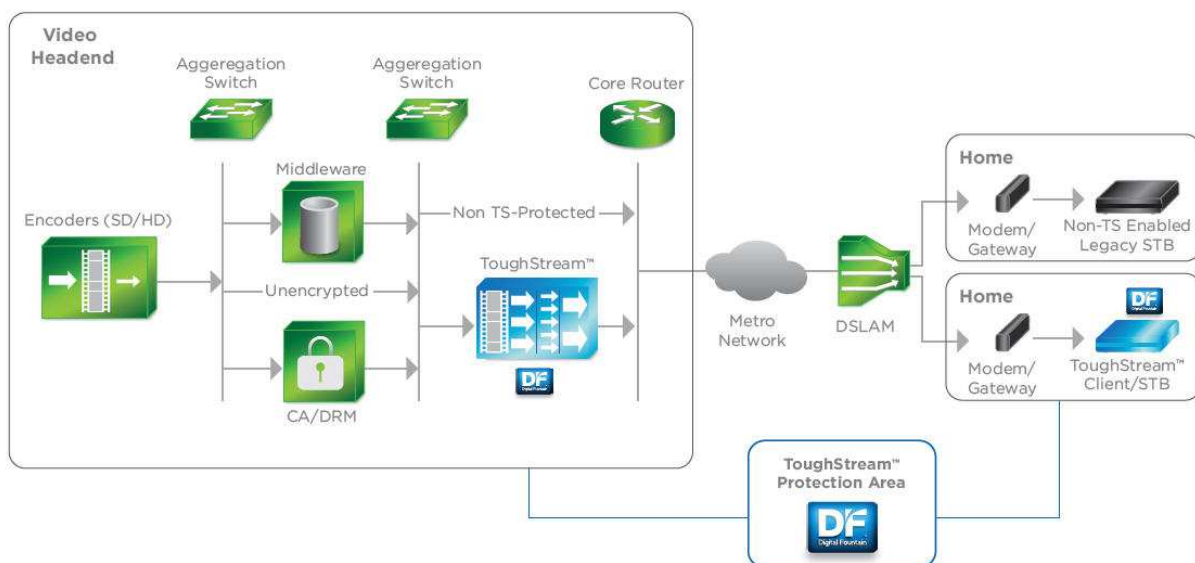
ToughStream technology has been selected in both standards and industry as a superior application layer FEC solution to resolve these access network issues in both IPTV and mobile video applications.

### ***Does ToughStream require RTP?***

No, while ToughStream can work with RTP, ToughStream is the only solution on the market today that can achieve its protection without requiring RTP. ToughStream can also leave the source video streams unaffected allowing existing STBs to operate without any changes to the legacy STB software or the network. This also allows for rapid deployment of the ToughStream solution.

### ***How do I integrate ToughStream into my network?***

DF ToughStream is comprised of two components: a transmitter that typically resides in a centralized Headend and a receiver that resides within the STB. Typically the transmitter is included as part of a complete software application on a dedicated server for ease of integration. By utilizing the ToughStream server software, headend integration is greatly simplified as shown below. The ToughStream receiver requires no dedicated resources and can be easily ported to just about any STB on the market today.



Since ToughStream doesn't require RTP, a rapid deployment is possible within existing environments. This architecture allows Digital Fountain to ensure end-to-end quality regardless of where the issue occurs (In-Home, Last Mile, Distribution, or Core).

***What are the network costs associated with adding ToughStream?***

ToughStream is an extremely flexible solution that provides the highest degree of protection with lowest Bandwidth and Latency costs. In addition ToughStream allows for Operator control for the Bandwidth and Latency costs.

***Which video formats does ToughStream support?***

ToughStream is agnostic to encoding formats and encryption methods. Whether you are using MPEG-2 or H.264, SD or HD, video or audio, or unencrypted or encrypted streams, the ToughStream solution will work with your system.

For more information about Digital Fountain® ToughStream visit [www.digitalfountain.com/iptv](http://www.digitalfountain.com/iptv)