What is CrossLock?

Comrex has introduced ACCESS/BRIC-Link 4.0 firmware with CrossLock. Comrex LiveShot video codec also uses CrossLock for enhanced stability of challenging IP networks. But what is it?

Q: OK, What makes CrossLock different than other IP streaming techniques?

A: The easiest way to describe the difference is to talk about how standard Internet streaming works. Virtually all systems designed for low-delay media on the Internet use some form of RTP/UDP streaming. In essence, they simply launch numbered packets in to the Internet, and hope they arrive at their destination in a relatively short time. Because UDP has no error correction, you're counting on the network's reliability. This usually works well enough for good, wired networks. But if packets get lost or delayed, it affects the media quality (resulting in audio or video drop-outs).

In the classic post office analogy, nobody has to sign for a letter's (or packet's) receipt and therefore there's no chance of resending it.

Q: Why not just use TCP instead of UDP, since it will retry lost packets?

A: Because TCP has way too much overhead for challenging networks. When things get really bad, the overhead of TCP actually adds to the problem instead of solving it. Imagine if the post office had to verify the receipt of every letter, then resend the ones that got lost. If bad weather stopped mail service, the "resends" would clog up the system so much it would be difficult to recover.

Q: So what's with CrossLock?

A: CrossLock creates a Virtual Private Network (VPN) between your codec devices. This VPN can have its own rules about when to resend packets, and it can do it in a much smarter way.

Q: Explain VPN please?

A: In the movie *Inception*, DiCaprio's character made people have dreams *within* their dreams. VPNs are like that. A network is created within the existing network that has no knowledge of the outer network. The VPN layer actually lies underneath the Internet layer. The VPN layer uses its own IP addressing, routing rules, and protocols.

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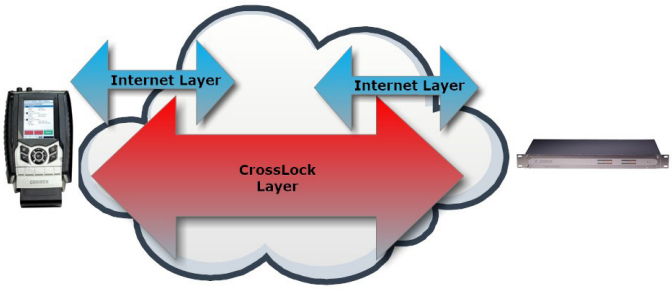
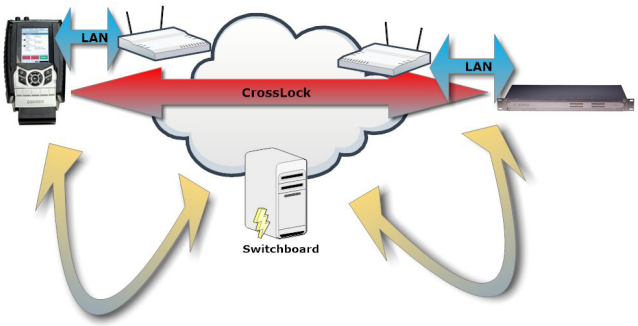


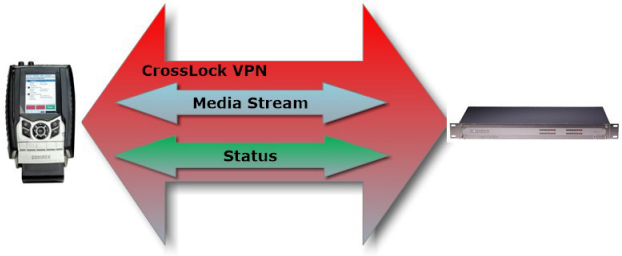
Q: So does this help with making connections behind routers?

A: With the help of the Comrex Switchboard Server, CrossLock does the "heavy lifting" of breaking through NAT routers (within limits) so your codecs can see each other over the VPN as if it were a local LAN.



Q: What else does CrossLock do?

A: Because CrossLock VPN has its own rules, it can decide when it would be an advantage to add resend-based error correction to the link (ARQ), as well as preventative error-correction (FEC). These decisions make up the "secret sauce" of Crosslock, making it very effective at fixing "bad" networks, while stepping back from networks that are "beyond repair" and not making them more difficult to recover. In some modes, CrossLock can also signal encoders to "throttle down" their data rate to avoid congestion, reducing quality but maintaining reliability. CrossLock does this by building extra data streams between the codecs that relay important information (e.g. decoder statistics back to the encoder).



Q: I heard CrossLock supports multiple network connections. True?

A: Absolutely. Each network connection (e.g. a pair of 4G modems on a portable codec) gets added to the CrossLock layer, doubling or tripling the available network bandwidth on that end of the link. This a very powerful tool to use when the network capacity is an unknown. Often, two different 4G carriers can insure *something* works well. But simply adding network capacity isn't enough. CrossLock is smart enough to estimate each network's upload performance, and apportion data appropriately. This is best illustrated using the statistics page of the codec's user interface. Using color-coded graphs, you can see that CrossLock likes each of its networks equally, and has applied about half of the data load to each network.

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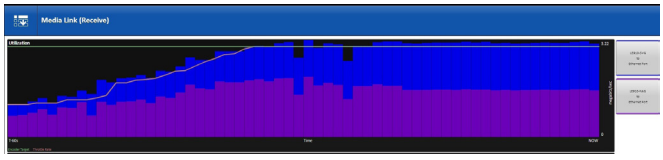
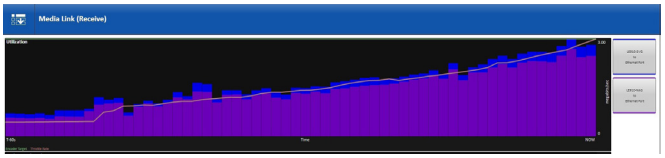


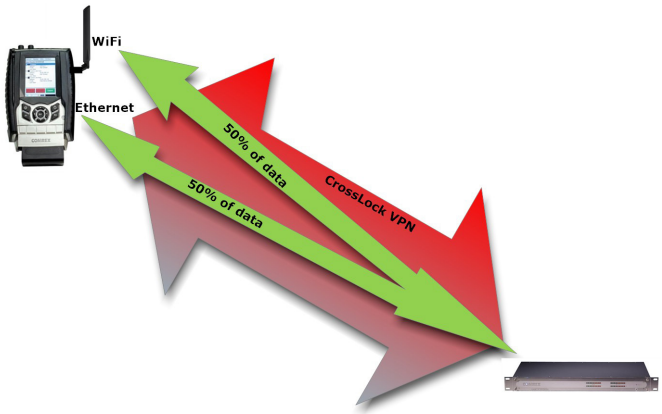
In a different scenario, CrossLock has chosen one network to move the majority of data over, and uses the second network very little.



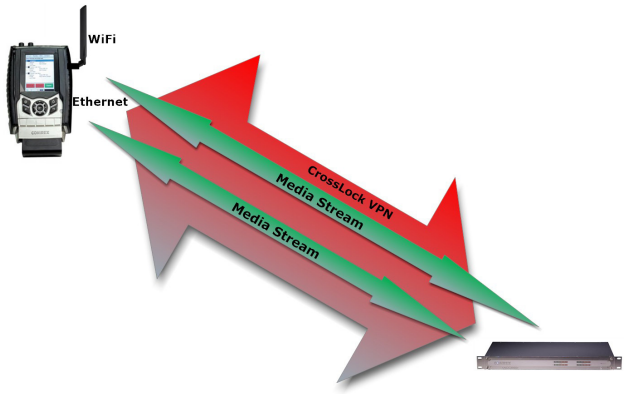
CrossLock may even choose to isolate one network completely, then monitor its quality until it's ready to be added back in. If one network fails entirely, CrossLock can move all the data to the remaining network, often seamlessly.

Q: I've seen some companies in this field promote redundant streaming. Is CrossLock better?

A: The "Bonding" mode just explained is best on unknown or marginal networks.



If you have multiple networks that are assumed good and have plenty of unmetered bandwidth, CrossLock can be set for Redundancy mode, whereby it will deliver the entire stream to each network. This can result in more of a guarantee of a seamless fallover if one network should fail completely.



In either mode, CrossLock is handling the NAT traversal, error correction and stats delivery in the background to make the most of what's available, and delivering the ultimate reliability possible on any given network.

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