

KA-SAT ON DIREKT LINK

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Sending over KA satellite is a way of reducing contribution cost for events on remote locations. KA-sat is usually an Internet connection, which means there is no guaranteed bitrate or quality. Also, KA uses high frequency, so it's more sensitive to bad weather than other satellite contribution technologies.

Intinor has developed several features to make high quality video contribution over KA robust.

INTINOR KA INTEGRATION

Intinor's Direkt link series can detect when a KA-sat modem is connected and read out status of the signal quality and symbol rate. A low signal quality will result in the modem changing to lower symbol rate which means that the highest possible bitrate available from the modem is limited.

Connection	Output	Link
IP1	0.05 Mbit/s	10.7 dB, 5 Msym/s
IP2	0.00 Mbit/s	not connected
CELL1	2.00 Mbit/s	50% LTE (Tele2)

Illustration 1: Viasat modem readout

Direkt link only use the KA-sat integration mode if the modem is connected to network interface IP1.

When using BRT™, Bifrost Reliable Transport, in combination with adaptive bitrate, a Direkt link encoder from Intinor can detect signal reduction and reduce the encoder bitrate to avoid packet loss and disturbances.

A description of BRT can be found here: <http://www.intinor.se/wp-content/uploads/2018/03/Bifrost-reliable-transport.pdf>

BONDING KA WITH 4G AND OTHER INTERNET CONNECTIONS

Using KA only for live contribution is always a bit risky. Bad weather can reduce video quality, something can cover the satellite beam or the Internet connection from satellite downlink to the receiver can have interruptions.

By combining KA with other Internet connections, the transmission can be more robust and the video quality higher.

RECOMMENDED SETTINGS FOR KA INTERNET

Bitrate "ceiling"

Intinor Direkt link can detect bitrate limitations caused by reduced signal quality, but there is no way to detect limitations from less than 10mbps booked capacity or best-effort. If Bifrost tries to send too much data, KA system quickly reduce the throughput sometimes resulting in packet loss and interruptions. To avoid this, Intinor can configure a bitrate "ceiling" for each unit. Contact Intinor support if you wish to limit your Direkt link to not using more than for example 6 megabit per seconds on KA Internet.

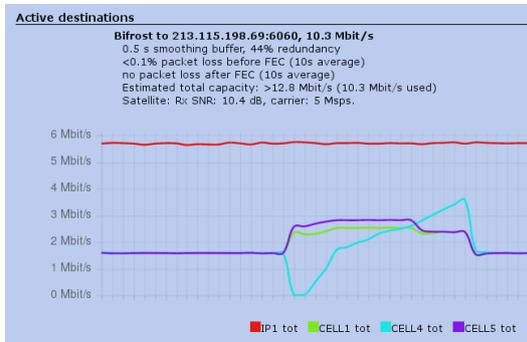


Illustration 2: Bitrate "ceiling"

In future software releases, it will be possible for the user to change the bitrate ceiling.

Encoding mode

Instead of trying to find the best bitrate for KA based on bitrate limitations, one can use an encoding mode with slightly higher bitrate in combination with adaptive bitrate. For example 7mbps also if only 6mbps is booked and there may be bitrate reductions from rain. If the bitrate ceiling is set correctly, adaptive bitrate will deliver optimal quality.

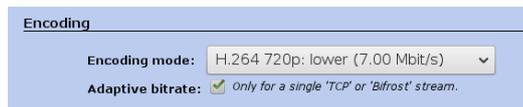


Illustration 3: Use adaptive bitrate

END-TO-END DELAY

After selecting encoding mode, one can see in the web interface what the "Estimated end-to-end delay" is with Bifrost. Since KA sat adds latency on the network layer, it's recommended to configure a custom end-to-end delay with 0.5 seconds extra based on the estimation.

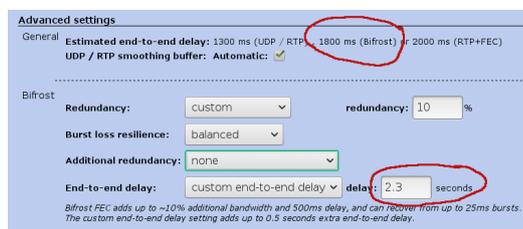


Illustration 4: End-to-end delay

DIFFERENT USE-CASE SCENARIOS

1. KA Only

When using KA only, to optimize the video quality, it's recommended to set redundancy to custom 10% and have no "Additional redundancy".

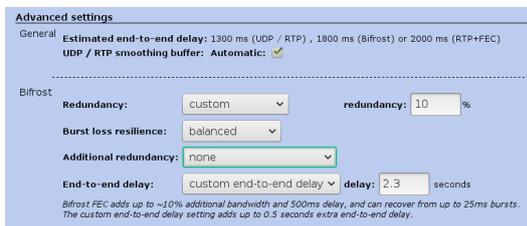


Illustration 5: 10% custom redundancy

2. KA booked + 3G/4G or other connections

When KA is booked, 3G/4G and other connections can be used to increase video quality and reduce the risk of interruption. If using 3G/4G, it's recommended to use at least two SIM-cards on different networks.

Redundancy is recommended to be balanced in combination with 100% audio redundancy (if audio is important).

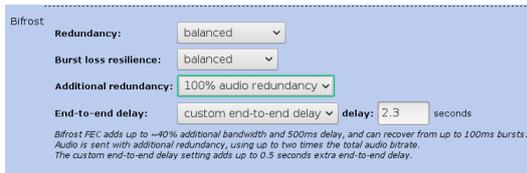


Illustration 6: Balanced redundancy and 100% audio redundancy

If KA is booked, the data is always paid for, so in system/data cost, set KA to free. Bifrost will use all KA capacity available and 3G/4G to improve video quality/redundancy.



Illustration 7: KA-sat is "free" if booked

3. KA best effort + 3G/4G or other connections

Bifrost can also be used to limit the use of KA data with other networks. KA is only used for redundancy and to improve video quality if needed. In this case, set KA data cost to high. but the other settings same as KA booked in last section.

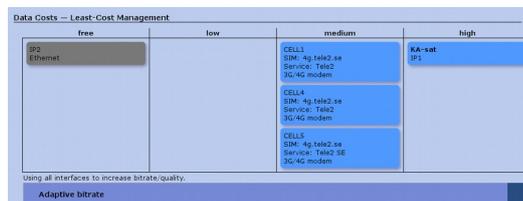


Illustration 8: KA has high cost if in best-effort mode

4. Full redundancy

It is also possible to configure Bifrost for full redundancy. In this scenario, more data will be used, both on KA and 3G/4G or other networks. Bifrost will aim for a situation where any one of the Internet connections can be removed without interruption in video or audio.

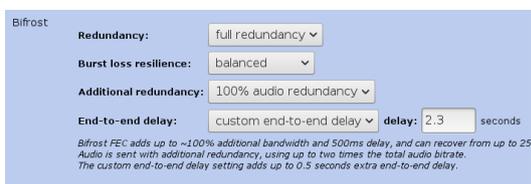


Illustration 9: Full redundancy

In this scenario, the video bitrate/quality may be lower. For example, if 10mbps is booked on KA, one 4G is connected, but with only 3mbps available, Bifrost will only send 3mbps. Otherwise, there will be interruptions if KA is disconnected.

BRT™– Bifrost Reliable Transport is Intinors own protocol for redundant multi-network transport