

Auto-Adjust Bitrate & Statistics for RTMP

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<http://www.nanocosmos.de>

info@nanocosmos.de

General Information

nanoStream 2.0 supports an “Auto Adjust” mode to control the encoded video bitrate to avoid network congestion.

The following modes are available:

- Automatic Bandwidth Checker to initially set a recommended video bitrate
- Dynamic/Adaptive Bitrate Control (ABC) during streaming
- The ABC can be controlled automatically by an internal algorithm, or customized by using the plugin *OnEvent* statistics events gathered by monitoring the tcp traffic on the sender side.

Bandwidth Checker / Get Recommended Bitrate

The bandwidth checker estimates the highest possible bitrate for your bandwidth, without

Note: please ensure that you have a stable internet connection during the bandwidth tests.

Adaptive Bitrate Control

Adaptive Bitrate Control additionally compensates dynamic bandwidth changes during streaming.

Applications – GUI and browser plugin

There is a checkbox “Adaptive” respectively “Adaptive Bitrate” available in both GUI and browser page, which enable the automatic adjustment of the bitrate.

How to use Adaptive Bitrate Control

- select a bitrate you want to achieve in the best (optimal) possible case (the maximum permitted bitrate)
- the minimum bitrate (150kB) can be changed (see Advanced Configuration Options)
- make sure the checkbox “Adaptive Bitrate” is checked
- start broadcasting

Important things to note

The bitrate will be adjusted every five seconds if necessary.

To achieve the best possible control of the bitrate you want to start the GUI or the browser plugin as administrator or as an user with administrative permissions. Otherwise the TCP traffic cannot be monitored and the actual bitrate, which is received on the client side, has to be estimated.

Connection Status and Network Statistics send via OnEvent

Event notifications sent via OnEvent consist of the event type and a set of key/value pairs containing the event information. Currently there are two types of notifications send via OnEvent: RTMP Connection Status and Network Statistics.

RTMP Connection Status Event

Type Id: 11

Key/Values:

`connectionStatus/connected, disconnected, reconnecting`

The connection status has three possible values. Besides connected and disconnected there is reconnecting. Reconnecting means that the plugin/rtmp client is currently trying to reestablish the connection to the server.

RTMP Network Statistics Event

Type Id: 10

The tcp traffic statistics are send as an JSON-Object.

Keys/Values:

```
{"outputBufferSize" : intVal, "outputBufferFillness" : intVal, "outputBitrateDefault" : intVal, "outputBitrateFallback" : intVal, "videoBitrate" : intVal, "roundTripTime" : intVal}
```

Meaning of the values:

- **outputBufferSize** : the maximum available buffer (in bytes)
- **outputBufferFillness**: how much if the buffer is used (in bytes)
- **outputBitrateDefault**: the estimated bitrate the packets are send to the stream URL, this value is estimated by using tcp packet statistics gathered with a tcp sniffer, only available when running as admin
- **outputBitrateFallback**: like outputBitrateDefault, but not as accurate; does not use a tcp sniffer, but is always available
- **videoBitrate**: the bitrate used by the video encoder at the moment
- **roundTripTime**: the average time in ms, which is needed to receive an acknowledgement for a sent packet

Note: if you only want the statistics but no automatic control of the bitrate make sure to uncheck the checkbox “Adaptive Bitrate” and check the checkbox “Tcp Sniffing”. “Adaptive Bitrate” and “Tcp Sniffing” can be activated/deactivated via `SetConfig(Option, Value)` with the parameters “AutoApplyAdaptiveBitrate” respectively “UseTcpSniffing” for Option and 0 (off) or 1 (on) for Value.

For how to use the statistics see the Javascript API and nanoStream.html sample for an example implementation.

Advanced Configuration Options

The internal algorithm for ABC can be adjusted by following variables, changed via `SetConfig(Option, Value)`:

- **NumberOfSamplesToUse**: how many samples from the statistics should be used for adjusting the bitrate, the default value is five (5)
- **BufferFillnessLimitIncBitrate**: the maximum allowed buffer fillness percentage for increasing the bitrate, the default value is five percent (0.05), this value should be smaller than or equal to `BufferFillnessLimitDecBitrate`
- **BufferFillnessLimitDecBitrate**: the minimum buffer fillness percentage, in which case the bitrate is decreased, the default value is ten percent (0.1), this value should be bigger than or equal to `BufferFillnessLimitIncBitrate`
- **DesiredBufferFillness**: the desired buffer fillness percentage, the default value is 7.5 percent (0.075), this value should be between `BufferFillnessLimitIncBitrate` and `BufferFillnessLimitDecBitrate`
- **MinimumBitrate**: this value is the lower limit for the bitrate, the default value is 50Kb (50000)
- **StartBitrate**: the bitrate used at the start of the broadcast, the default value is 150Kb (150000)
- **RTTLimitFactor**: the bitrate is only increased, when the round trip

How ABC works

When broadcasting starts the bitrate is set to the value `StartBitrate`. The bitrate will be checked and possibly adjusted every few seconds - the number of seconds is specified by the value `NumberOfSamplesToUse` (if set to five, every five seconds). Depending on the conditions when a check occurs the bitrate will either be increased, decreased or not changed at all. The bitrate value will neither be changed to a value higher than the user selected bitrate nor lower than the `MinimumBitrate`. If an event occurs, which lowers the available bandwidth, the bitrate will be decreased accordingly. Vice versa the bitrate will be increased if there is bandwidth available. It can take a few minutes to reach the maximum bitrate depending on the size of the gap between the user selected bitrate value and the current bitrate.

Further Information and Services

Further information and extended services are available upon request.
Please contact us for further information.