

WHITE PAPER

Enhanced H.264 Technology
iZone and iStream

1. Introduction

Enhanced H.264 Basics

It is the top priority to address the heavier bandwidth exploitation for the upcoming era of 4K high-resolution surveillance cameras. Since it is still a long way to go for the prevalence of the next generation codec currently, several manufacturers have already introduced their unique methods based on H.264 technique to subtly save bandwidth.

For instance, motions, the main crux to fluctuate bandwidth, within a scene can be identified via intelligent codecs. That is to say, when less motion within a scene, the camera can lessen the frequency of I-frame, thus reducing the bandwidth wielding. However, if any motion occurs, the camera is able to generate I-frames immediately to render a clear image for critical evidences of motions.

Consequently, the Enhanced H.264 technology, which effectively reduces bandwidth with rarely sacrificing critical image quality, has become the main and ongoing assignment for us to make our products standout from the competitive market.

2. Enhanced H.264 Technology

Generic H.264 Technology Overview

Prior to understanding the Enhanced H.264, the following elaborations for 2 major parameters of the “Generic” H.264 technology are the entry concepts for you to realize beforehand.

1. Compression Level

Generally, regardless of complexity, the compression level is unified for the entire video encoding. When a vehicle, for example, parks in front of a white wall, both the white wall and the vehicle are compressed at the same level, which is technically short of the flexibility to adjust variable compression level on different areas. The higher the level, the harder compressed video with inferior quality is produced and vice versa.

2. GOP (I-frame interval)

In addition to I-frame, there are 2 types of inter frames, P-frame and B-frame. A GOP (Group of Picture) is composed of the 3 kinds of frames, among which I-frame, which doesn't require extra information to be decoded, can be regarded as a solely reliable reference. In “Generic” H.264 way, I-frame interval is fixed, which indicates that camera generates an I-frame during a fixed frequency. However, due to the attribute of a solely complete image of I-frame, the more I-frame within a video stream, the higher bandwidth will result in.

2. Enhanced H.264 Technology

Enhanced H.264 Technology Attributes

A variety of titles for Enhanced H.264 have been introduced into the market so far. Axis claims its bandwidth saving feature as Zipstream, whereas Vivotek called its feature as Smart Stream. In fact, not only is the naming diversified, but the performance on compression and bandwidth savings varies as well. Here we emphasize on the most general features by Enhanced H.264 as follows.

1. ROI

ROI (Region of Interest) is, generally speaking, to achieve better image quality for the region specified by user while maintaining the target bitrate. By allowing user to outline the prioritized area as the so-called "ROI", the different compression levels will be exerted on ROI area and the external area individually, thus resulting in higher quality within ROI, but inferior quality, on the other hand, for outside area.

2. Dynamic ROI

Amid a scene where both interested zone, i.e. objects with motion, and uninterested zone, namely still background, coexist, the camera with Dynamic ROI can swiftly identify the dynamic interested zone and treat the zone with varied compression level from the rest zones. By doing so, the interested zone is less compressed, whilst the rest zones are compressed harder, thus reducing bandwidth waste on useless information within a scene.

3. Dynamic GOP

Via adaptively adjusts the number of I-frames to the minimum level during the periods with little or no motion, the camera with Dynamic GOP is capable of largely decreasing the bandwidth utilization, which varies from the result of standard fixed GOP structure, therefore saving the bandwidth, especially beneficial for application with fewer motions occurred and limited network resource.

2. Enhanced H.264 Technology

Enhanced H.264 Feature

Our Enhanced H.264 utilizes both iZone and iStream technologies to not only economically exert leverage between different regions and compression levels, but also effectively reduce the average bit rate as the following elaborate descriptions.

1. iZone

Adapted from ROI, the proprietary iZone by our company further adopts the intelligent algorithm to place diverse compression levels upon different areas. Similar to the setup of ROI, user is allowed to designate a customized zone. The user-defined zone will be compressed less, maintaining the crystal evidences of image quality, while the undefined zone will be sacrificed in its image quality by more compression ratio.

2. iStream

The major objective from iStream is to help saving bandwidth utilization intelligently based on the 2 cutting-edge features as follows:

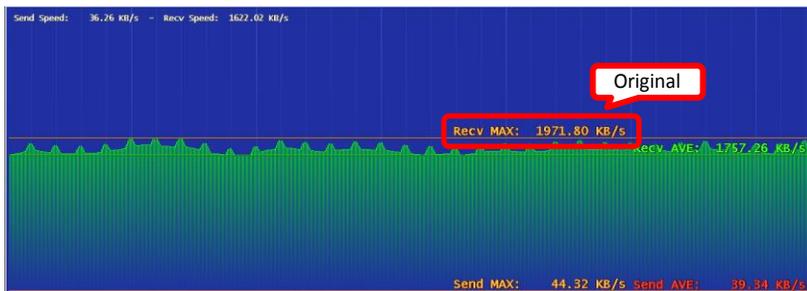
- EcoZone

As opposed to iZone, the newly endowed “EcoZone” by our company can swiftly identify dynamic motion occurred within live image and retain its details with clear quality, whereas the rest areas, e.g. static background, will be imposed on higher compression level, thus economically decreasing bandwidth wielding on less important things and still keeping the dynamic critical information for forensic purpose.

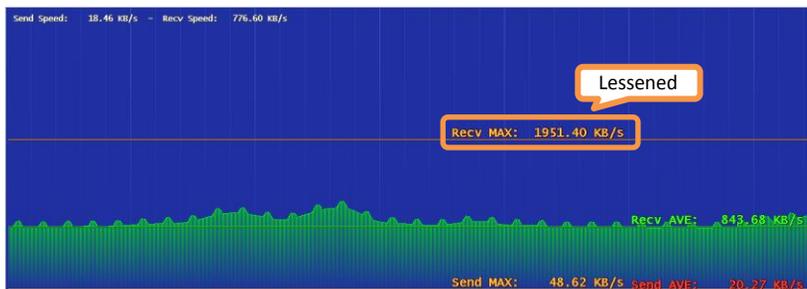
- EcoFrame

By enabling our proprietary EcoFrame function, the overall bitrate, i.e. bandwidth utilization, will be reduced even further. When less motion happens within a scene, e.g. storeroom, I-frame number will be cut down in a large scale by EcoFrame activation. Based on divergent complexity of scenes and motions occurred, approximate 30% to 70% bandwidth saving can be achieved to render a compact yet valuable performance on bandwidth utilization.

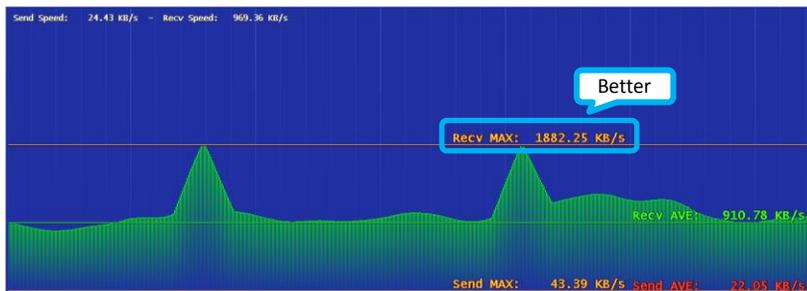
2. Enhanced H.264 Technology



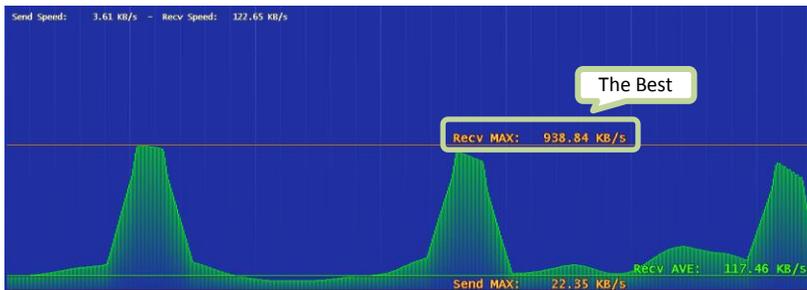
Original Bandwidth



Bandwidth Savings by EcoZone Enabled



Bandwidth Savings by EcoFrame Enabled



Further Bandwidth Savings by Both EcoZone & EcoFrame Enabled

2. Enhanced H.264 Technology

Bandwidth Savings Performance

The outstanding result below by enabling both “EcoZone” and “EcoFrame” can save up to approximate 70% or above on bandwidth and storage cost, the noticeable performance than ever!

| Average Bit Rate | Outdoor | Indoor |
|--------------------|---|---|
| |  |  |
| w/o Enhanced H.264 | 14763 kbps | 14619 kbps |
| w/ Enhanced H.264 | 1727 kbps | 557 kbps |

Comparison Table for Enhanced H.264 Activation

3. Conclusion

With the groundbreaking Enhanced H.264 technology, we are able to provide our customers with the top-notch solution on video streaming compression and GOP frames adjustment. We deeply believe that, by opting for our company, you will find the very answer to strike balance between bandwidth savings and crystal image quality.