

# IPTV SIGNAL QUALITY ENHANCEMENT FOR BETTER SUBSCRIBER EXPERIENCE



 **NETvisor**



## iTVSense BEC

### *IPTV SIGNAL QUALITY ENHANCEMENT FOR BETTER SUBSCRIBER EXPERIENCE*

NETvisor's **iTVSense Backward Error Correction (iTVSense BEC)** is an innovative and cost-effective technology for improving the quality of media transmission and increasing customer satisfaction. Beyond the obvious benefit of better pictures on the TV-s, this technology also provides a new and particularly accurate tool to survey and diagnose the status of subscriber access lines.

## Benefits



- The experience of our telecommunication operator customers – on their live, production IPTV services – shows that 90 - 95 % of video signal errors caused by packet losses can be corrected using NETvisor's BEC technology.
- The quality improvement is clearly perceived by subscribers, de facto increasing customer satisfaction.
- Operators obtain outstandingly detailed statistics and logs on all correction events, which can be automatically used to drive proactive repair processes.
- Thanks to its efficient architecture, the system has low resource requirements and is highly scalable, even up to several million subscribers.
- It is compatible with xDSL, GPON and DOCSIS-3 access technologies alike.
- Applicable both for multicast (live TV) and unicast (VoD, Catch-up TV) traffic.
- Can be deployed as an add-on to any existing IPTV system which uses Linux Set-Top-Boxes.

“NETvisor's IPTV Enhancement technology not only delivered significantly better TV streams to most of our customers, but also enabled us to repair failing devices and lines in a proactive way.”

**Alex Coroian,**  
TV Service and Technology specialist,  
**Invitel**



## Simple and Cost-effective Installation – Instant Benefits

- iTVSense BEC results in spectacular improvement in service quality for the most typical IPTV network problem category, i.e. when packet losses occur on the access lines or at the subscriber premises. According to measurements performed in some operator's real service environments, the system is capable of correcting several hundred packet loss errors in a minute on each individual subscriber access line - with 90-100% efficiency.
- Apart from improving customer satisfaction, the system also facilitates the work of service providers by collecting detailed statistics and logs on correction transactions, enabling operations to analyze the nature, frequency and characteristic curve of faults. This information is invaluable for improving operational efficiency, for launching proactive troubleshooting and repairs and for identifying necessary and justified developments on the access network.
- iTVSense BEC is a lightweight technology both in terms of costs and hassle-free implementation. The client side is an agent deployed on the Set-Top-Boxes. It is a tiny, and dynamically loaded Linux kernel module, so it does not interfere with the STB ecosystem (operating system, user interface, EPG, games and other add-ons etc.) in any way.
- The server side is an array of commodity servers which can be distributed among the PoP-s of the service network, but for small/medium providers, just 2-3 machines in the central head-end will deliver efficient quality enhancement for the whole subscriber base.

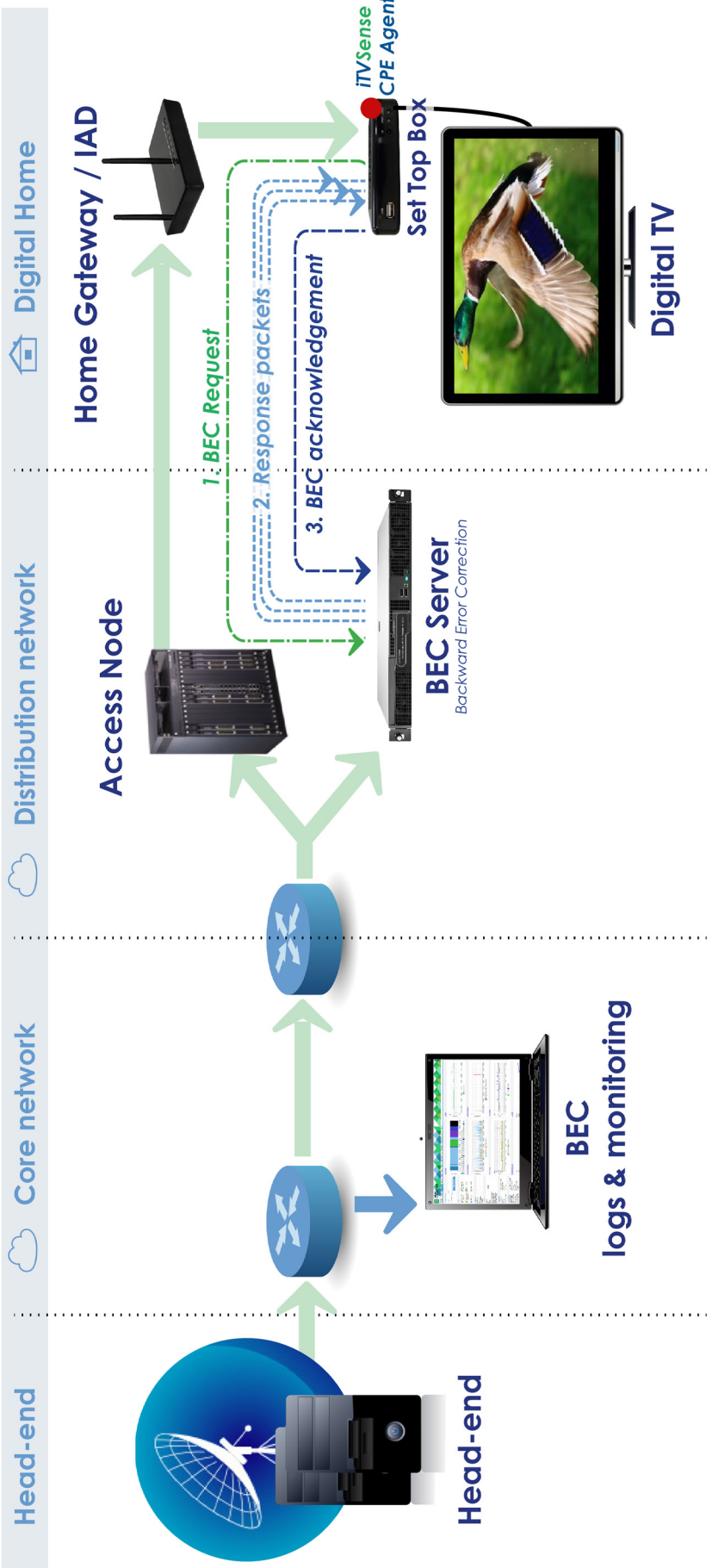


## How it works

1. BEC servers continuously receive and temporarily store IPTV stream packets.
2. The Set-Top-Box agents detect lost packets in the IPTV signal and report these losses to a BEC server responsible for the stream.
3. BEC server considers whether the error can be corrected. If so, the missing packets are resent to the client in unicast, or in multicast if many STB-s report the same error.
4. While the error report is pending, the later packets arriving at the STB are held in the STB kernel by the error correction module.
5. Whenever the correction packets arrive (but also when a timeout occurs), they are inserted into the packet stream followed by the later arriving packets buffered. The consumer application thus receives the packets in the original, correct sequence.
6. The whole repair transaction typically takes 30 to 200 milliseconds.
7. At the end of each transaction, the STB provides a feedback on the outcome of the correction.
8. The correction logs are accessible for the operations team in the iTVSense Manager, both as detailed, low-level data, or aggregated into automatically generated SLA reports.

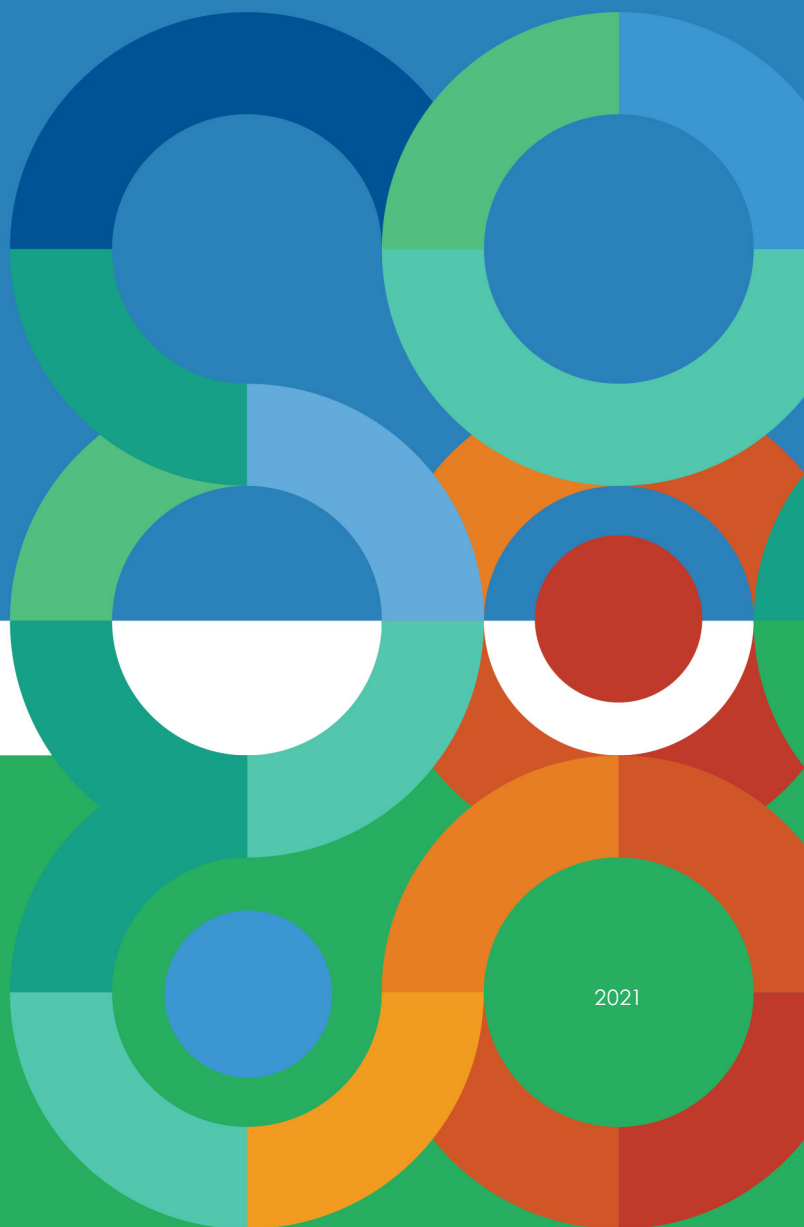


# iTVSense Backward Error Correction (BEC) - System Architecture



# **NETvisor**

improving the quality & efficiency of ICT services



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