TURNING BIG VIDEO INTO BIG REVENUE – A VAST OPPORTUNITY FOR SERVICE PROVIDERS, SAYS ZTE

Heng Yunjun, FN Product Team Director, ZTE Corporation

The Big Video era – characterized by the arrival of 4K and 8K TVs and Virtual Reality (VR) services – gives operators a tremendous opportunity to develop large scale video service provisioning at the edge of their network.

Bringing Big Video into the network is clearly not without its challenges. However, video provision already accounts for around 90% of the huge increase in broadband demand throughout the world, and it seems inevitable that Big Video will be the next step in the process of network transformation. This article highlights how innovative and committed operators can make the early changes in their network that will pave the way to delivering, and opening up major new revenue streams.

Big Video will make different demands on the operator from the traditional voice and internet requirements, which centre around three main areas that need to be mastered – large amounts of bandwidth, high concurrency and low convergence, and low latency and packet loss rates. Still, the solutions are there, as are the rewards for operators looking to capitalise on the opportunity.

Principal Issues

Large bandwidth

Big Video services necessitate large streams. For example, a stream of standard 4K video service runs at a minimum of 45 Mbit/s bandwidth, a stream of standard 8K video service runs at a minimum of 180 Mbit/s bandwidth, and a stream of 8K VR+ service runs at a minimum of 1.2 Gbit/s bandwidth.

In addition to this, household multi-screen requirements challenge the access network to be able to transmit household-bound data by megabit, gigabit, and 10-gigabit bandwidths.

Ultimately, Big Video services will present major challenges to DOCSIS-based cable access technologies, twisted pair cable access technologies, any PON-based FTTx access networks that include NxGE, Nx10GE, and Nx100GE networks, and uplink capabilities and optical fiber resources of Optical Line Termination (OLT) devices.

High concurrency and low convergence

Big Video services require transmission of large streams over long periods. This means that a great proportion of subscribers stay online in peak hours and traffic convergence is low in the access network. In this case, it is necessary to reduce the access network convergence levels and the convergence rate of uplink bandwidth against access bandwidth. The Big Video streams, however, are hardly able to adapt to the existing access network where this has multi-level convergence nodes, such as the Multiple Dwelling Unit (MDU), OLT and Broadband Remote Access Server (BRAS).

Low latency and packet loss rate

Analysis results indicate that large video streams have lower tolerability over network latency and packet loss. When the end-to-end bidirectional latency is 25 milliseconds, the 4K Video-on-Demand (VOD) service requires less than 0.01% packet loss rate and the 4K live video service requires less than 0.0001% packet loss rate. The access network must have a bidirectional latency of less than 15 milliseconds when the Content Delivery Network (CDN) and household network latencies are not counted. The current access network is vulnerable to latencies and packet loss due to several factors. Firstly, the latency attributes vary with access technologies, and secondly, the existence of more access network levels prolong the latency and deteriorates the congestion-resulting packet loss, consequently affecting video transmission. Finally, the access network needs to have its Quality of Service (QoS) configuration and scheduling optimized for each subscriber and service to ensure fluent transmission of video services. In this case, various streams burst in large quantities, posing a challenge to the access device QoS capabilities.

What are the solutions that will see Big Video turn into Big Revenue for hard-pressed operators? There are *five* key areas that ZTE sees as fundamental to having a network that is "Big Video Ready"

For Big Video to deliver, the FTTx network will need to ensure a 100 Mbit/s household-bound bandwidth, which means upgrading the FTTH EPON to the FTTH 10G-EPON. It will need to reduce the split ratio of FTTH GPON, or upgrade it to FTTH XG-PON to provide a higher bandwidth, as well as upgrading the FTTB GPON/EPON to the FTTB XG-PON/10G-EPON. Where DSL copper cables are connected to households, operators can deploy the DSL diagnosis system on the copper cable network and check the line performance to determine whether the 4K video service rollout is supported and which service portfolio, therefore, can be selected.

To adapt their networks to handle Big Video service development, operators will have to increase the OLT uplink bandwidth from NxGE to Nx10GE or even Nx100GE. If an Optical Transport Network (OTN) is deployed in the convergence layer, it will have to use the OTN to flexibly expand the uplink bandwidth as required. Peak traffic on each uplink interface will also need to be monitored in real time or periodically.

It will be essential for operators to isolate Big Video services from Internet services to abate resource collision and ensure the QoS. At the same time, access operator-owned Big Video services will need independent IPoE channels to relocate multicast replication points to OLT devices, which will reduce the bandwidth consumption.

Using OLT devices with distributed caching and H-QoS capabilities to better support Big Video services will require sufficient cache on the OLT main control card and PON cable clip to minimize packet loss during burst transmission of video services. The distributed caching enables the OLT to enlarge its cache as the number of subscribers grows. The operator must also ensure that the OLT has H-QoS capabilities to prevent congestion.

To smoothly upgrade to the necessary 10G-PON, service providers can utilize a Combo PON solution. A Combo PON interface incorporates the XG-PON and GPON interfaces by using the multiplexer built into the optical module. The interface uses a single optical fiber link but corresponds to two physical channels. In the downlink, two independent PON MAC interfaces convert data to signals of different wavelengths. Then the optical module receives and multiplexes the signals, and transmits them respectively to the XG-PON ONU and GPON ONU. In the uplink, the XG-PON ONU and GPON ONU transmit signals of different wavelengths. Then the optical module receives and demultiplexes the signals, and transmits them to different PON MAC interfaces. The Combo PON solution enables subscriber data of the same Optical Data Network (ODN) to pass through the XG-PON or GPON interface as required, avoiding the expenditure that would result from a full ONU replacement. In addition, the external WDM1r devices are spared to minimize the amount of space used in the equipment room and also to simplify deployment.

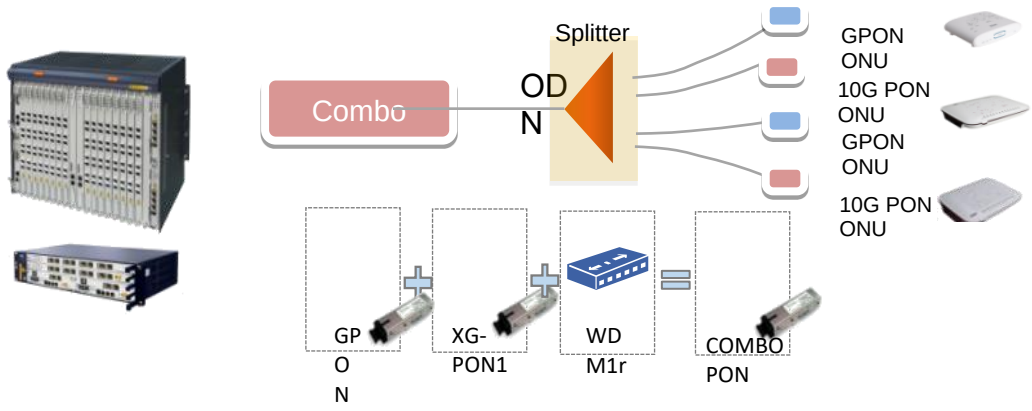

Figure 4 Combo PON solution

It seems almost certain that Big Video will play a key role in future network transformation. These solutions open up a world of opportunities for service providers, and are a valuable opportunity that providers should not ignore, if they want to succeed in this ever-competing industry.