

FROM INTELLIGENT SERVERS TO INTELLIGENT HOME DEVICES

By Jean-François GALTIER, Netgem



“The time is now and it will happen within the home”

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INTRODUCTION

The debate opposing centralized mainframe architectures and decentralized workstations started over 30 years ago in the IT market. The coming of age of Cloud Computing is a tribute to Sun Microsystems' vision of “The Network is the computer” set out as early as 1984. However, the jury is still out on this, and the demise of Sun in 2009 showed the extreme complexity of this space where the pendulum regularly swings from centralization to distributed computing and back. One reason for this is counter-intuitive: big servers with thin clients don't scale well in the real world for certain types of applications.

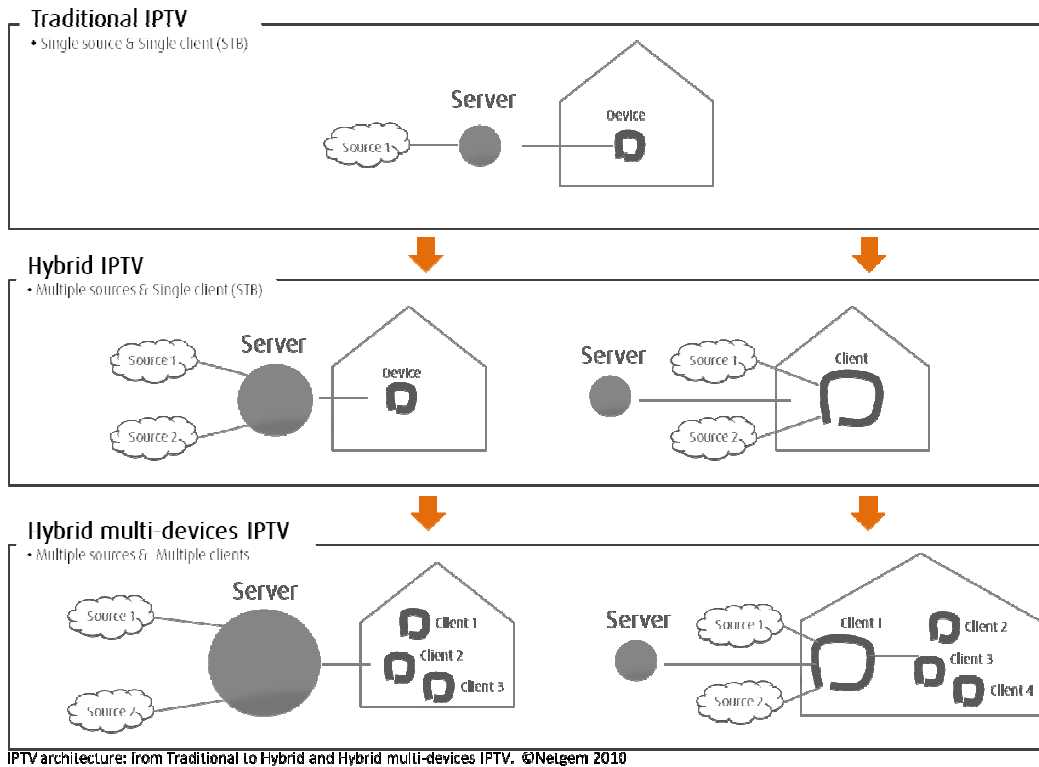
This is particularly true when delivering a guaranteed quality of service, which is the case with IPTV. That ancient IT debate is again at the forefront of decision makers' minds, as operators scramble to put up new interactive, web-enabled TV services. A balanced approach driven by both cost and TV's convergence with the Internet does however exist. This white paper explains how and why digital TV service's “intelligence” has gradually been moving away from big central servers, into devices in customers' homes and how a balance might now lie in “distributed middleware”.

EARLY IPTV

Prior to 2005, Telco TV deployments used low-end “zapper boxes” leaving the central server to manage all functionality and store all the data required to run the service.

Network engineers presumed that their cherished IP networks would cope with the load and with their very first early-adopter subscribers, things were looking rosy for Telco's using big servers and thin clients – in 2004 Scott McNeilly would have liked it.

The architecture was easy to deploy on set-top boxes running very little software. It promised to enable converged services within IMS-like network architectures. Central service platforms were going to be network agnostic.



SCALABILITY

However over time, other aspects of this centralized approach just didn't scale. Huge central databases of both content and user specific data can become bottlenecks.

Integration was supposed to be easier with thin clients (i.e. set-top boxes running simple software with few features), but many operators found the opposite, as the number of network interconnections and requests exploded exponentially. Take the example of channel changing in the early implementations. IP network engineers designed "best effort" channel changing to go through the central system. Set-top boxes would obtain the latest EPG data to display from a central server at each channel change. TV viewers are very demanding and linear TV implies that much of the user base interacts with the service at exactly the same time. Often, when the main evening news is over, users all start zapping at the same time. The critical mass of subscribers that started crashing centralized Telco TV servers - or at least freezing the service for many seconds at a time - was about 50 thousand, often during the Operator's second year of operation. That's when

they started pushing data and functionality out to the set-top-boxes.

Centralized IMS architectures were also designed so that IPTV could be seamlessly rolled out from a single group of servers onto mobile devices.

But content owners still do not allow storage in the cloud. For rights issues, PVR functions are hence maintained in the home.

And second, the relatively low success of MobileTV and especially its broadcast version shows that TV consumption is mostly a home activity and that the first TV convergence that users truly wanted was not outside but within the home network, between PC or Tablet and STB and their mobile phone, while at home.

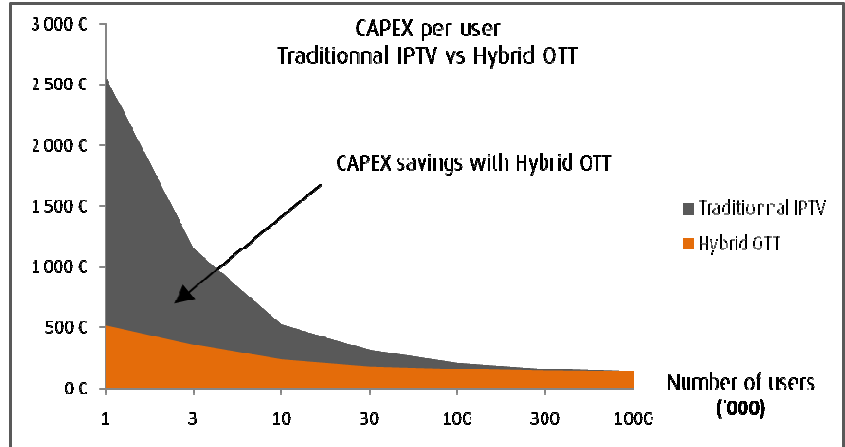


COST & ARCHITECTURE

Centralized architectures imply very expensive upfront investments with large servers and network equipment. Traditional unicast VoD streaming brings high fixed costs, as network operators must plan for peak usage so that most equipment is used 5% of the time at best.

On the Internet, CDNs can easily be shared and traffic no longer needs to travel down different paths. Newer streaming technologies, where the end device has a more active role, enable the load to be spread more efficiently.

Progressive download and adaptive or smooth streaming are two such examples that illustrate how a client with some processing power and storage can save on network infrastructure by adapting itself to different and variable network conditions hence removing the need to provision any fixed bandwidth. As devices take on more of the load, dedicated service platforms with huge databases are no longer required. The up-front CAPEX saving typically reaches 5 to 10 million euros for a mid-size operator and can also save up to 10 to 20 euro per user per year. Device CAPEX is not upfront and considered financially a marginal cost to be paid only as business grows.



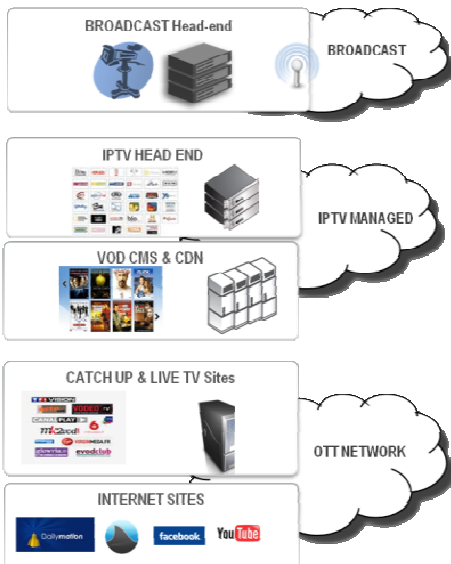
CONNECTED DEVICES & OTT

Traditional IPTV and more generally PayTV needs to be unbundled: Opening to over-the-top content, distributed through un-managed networks and reaching an array of connected devices beyond the STB. In the age of convergence, purely server-centric architectures are becoming rapidly obsolete as they are proving unable to cope with two major and simultaneous demands, namely: connected devices and over-the-top services.

As the dust settles on the cord-cutting OTT phenomenon, end-users will want their new TV sets, tablets or other connected devices in the home to be able to deliver such managed services. Operators want that too.

Integrating proprietary standards and protocols of the major centralized IPTV platforms on standard consumer electronic devices is not a solution. Operators have to work with so many vendors to validate, certify and integrate so many different devices and models running different software versions. The task would be never-ending.

Even if such an endeavor were undertaken, it would not be sustainable for





the service platform to authenticate, register and then remotely manage such a plethora of devices. Databases would grow too large and the volume of simultaneous network connections would make scalability difficult to achieve. Convergence and social media are driving demand for content, applications and services from the Internet to be added to the TV experience.

Traditional service platforms configure service portals and user experience centrally. This doesn't work so well in today's Internet world. Metadata for example might need to be stored and managed in the home, as it is the users who customize the service by selecting what applications to download.

DIVERSITY

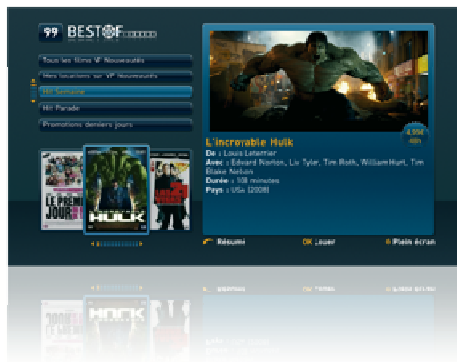
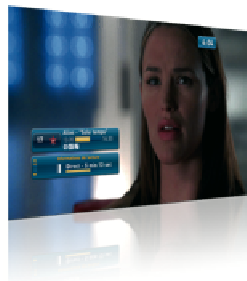
Diversity of home networks and personalization have been among the hardest scalability issues to resolve with big centralized IPTV services. Central service platforms are efficient at managing a large database of identical cases, but not at managing diversity. No two home networks resemble each other. Content sources vary widely and last-mile network quality is never standardized, even in recently rolled out networks. The traditional approach has had to establish a common denominator for all users. Using the same network bandwidth, the same video quality and the same service features for all subscribers has sometimes meant using the lowest common denominator. Today, the early IPTV operators are finding it harder to keep churn under control as users are so very different by nature and their domestic environments are diverging further.

THE TIME IS NOW

The message to operators here should be clear. It's better to join an unstoppable tide than oppose it. Operators need to be more agile. Letting suppliers handle some of the load of device management is one

way forward. Many key services can be advantageously delivered closer to the network's edge, even in the Customer Premises Equipment in many cases. Choosing the best network route - depending on access network conditions and available bandwidth - can for example be optimally achieved from within the home.

If self-care portals and user interfaces for customizing the service and applications are run at least partially from within the set-top-box, the user experience is enhanced by a greater responsiveness and availability even when network



conditions are bad.

As each home will use a different set of services, aggregation of metadata from different sources can also best be achieved inside the home. Beyond the managed operator services, where metadata comes from the central service platform, further information is required from other unmanaged networks, home devices and local storage.

Content storage and redistribution to other home network devices, including content access and content rights translation, as well as local portal management can also be achieved from within the home network.

There's a pendulum swing away from centralized architectures back to more decentralization. Operators must be careful not to let the swing be too extreme or they will end up with fully-fledged PCs under the TV. The term middleware has been overused, but if it still has any mileage left, I believe a "decentralized middleware" is a correctly balanced solution in today's market.