Cloud TV: A techno-economic approach in the Emerging Era of the Internet of Things

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Abstract

Cloud TV is a cloud based live television streaming program or app, allowing the user to watch HD TV channels, without the requirement of a TV box or aerial but only a stable internet connection. The number of Cloud TV channels continuously increases, so does the need for a techno-economic evaluation and analysis, which constitutes the aim of this paper.
The analysis aims to provide an assessment of the required investment for a new Pay TV operator, using Cloud TV technology in the Internet of Things (IoT) era. The adopted methodology includes demand forecasting and cash flows calculations and important economic indicators, such as Net Present Value (NPV) and Internal Rate of Return (IRR), for a time period of ten years and different diffusion scenarios. Evaluation of the methodology was based on statistics obtained from one of the larger telecom providers in Greece. Results indicate that investing on Cloud TV technology in Greece is feasible for the technologies of OTT, IPTV and Smart TV. A sensitivity analysis is also performed, studying the case of a new entry for a Pay TV operator in the local market, which gain a significant percentage of customers.

Keywords: Technoeconomic analysis, Cloud TV Technology, OTT, IPTV, Smart TV.

INTRODUCTION

Cloud computing has already gained ground across the business market, as an innovative, agile and elastic provisioning model for Information and Telecommunications (IT) resources. Enjoying their second decade of existence, maturing cloud technologies have reformed the expectations and capabilities of the IT industry expected to play a crucial role in the new era of the Internet of Things (IoT) [1]. IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, resulting in improved control, efficiency and economic benefit, with reduced human intervention. In a IoT world with billion connected devices, the classic distribution networks are migrating in a broadband environment through the cloud computing services. The broadcasters and the communication operators who want to offer video services are faced with a daunting task: ensuring the live and on-demand video on any device. The operators that want to capitalize this change need a complete television platform based on cloud computing (Cloud TV), that drastically reduces the time to market and increases the revenues.

Cloud TV refers to a flexible television option in which customers can take their shows on the go [1].Cloud technology, as related to Cloud TV, works in the same way that other cloud services do, such as webmail, shared files, or online storage. "Cloud services" may refer to online media sharing and media streaming services. The industry of Cloud TV technology with integrated cloud playout platform enables TV operators to manage their entire video channel operation virtually over public and private clouds to quickly reach new markets, introduce new channels and effortlessly scale to realize new levels of profitability. Most importantly, TV operators can transition to a public or private cloud at their own pace, and maximize existing investments through a hybrid deployment approach, integrating new, virtualized infrastructure with their current on-premises systems. Many vendors of Cloud TV have invested in uniquely flexible and scalable cloud-based media and playout solutions that enable customers to launch new channels, expand their audiences and deliver cross-platform services with much lower startup and capital equipment costs and spanning advertising, traffic and billing, automation and multiservice playout. A Cloud TV Platform is built on a suite of core modules which provide unrivalled flexibility and power across the entire delivery workflow. There are many advantages for a provider to choose the cloud solution, such as low entry cost, fast time-to-market, there are some disadvantages though, such as latency on live events.

In contrast to traditional TV channels that would need dedicated equipment and technical stuff, IPTV channels on top of the cloud will enable one simple user to manage many channels without the need for neither dedicated equipments nor technical stuff.

In addition, by enabling users to create OTT, TV channels on top of the cloud will make the content more customized for social communities [2].An advance in the cloud computing technology facilitates is the creation of media delivery infrastructure along with enabling techniques such as transcoding on the fly. Nowadays, most of the cloud providers adopt pay-as-you-go model, whereby Pay TV operators will pay only for the resources that they use, including storage and traffic communication. The videos of a channel will be cached in servers that guarantee the Quality of Service (QoS) for its subscribers. In order to reduce the cost for the channel owner should minimize the caching and the streaming time. A proposed solution [3] schedules videos at the same time in the programs, of as many channels as possible, and places the different videos in the same cache servers, in such a way that the number of effective streams created in the network is minimized.

The vastly distributed nature of IoT applications will require additional investments in computational and communication infrastructure. In this context, pay TV operators are expected to invest in Cloud TV, will is expected to play an important role in future smart home networks. In this context, the purpose of this paper is to study from a technical and economical point of view the investment of a new TV operator based on Cloud TV technology with the appropriate choice of a Cloud TV provider. In Section II the Cloud TV technology is presented, over a number of different platforms, such as Over The Top (OTT), Internet Protocol TV (IPTV) and Smart TV. The advantages and disadvantages of this solution are also presented. Section III is devoted in the presentation of the analysis of the global and local market, the global and local competition and industry assessment. A techno-economic analysis is also performed, including the demand forecasting, and the cost of the investment, based on a cash-flows approach[4]. Product development for Cloud TV is considered in three areas of IPTV, Smart TV and OTT devices. Conclusions and future directions are presented in the concluding Section IV.

CLOUD TV TECHNOLOGY

What is Cloud TV Technology

Cloud TV technology provides television subscribers with greater flexibility when accessing live and recorded content. Cloud TV customers can easily stream and download DVR (Digital Video Recorder) shows to any Internet-enabled device. The advanced technology behind cloud TV allows for live in-home streaming and anywhere-access to a personal library of new television series or favorite movies. Cloud TV technology allows television subscribers to stream their saved recordings from anywhere. In addition, they can also download content to a tablet or smartphone to watch while offline. One of the best parts about Cloud TV is that everyone in the family can enjoy their favorite shows in any room, or on the go. Innovations in Cloud TV provide an enhanced entertainment experience for the whole family. Any updates or innovations to Cloud TV functionality can be made available to users in real-time..

A crucial aspect of assessing Cloud TV as a candidate for future implementation is technological feasibility. While nowadays cloud computing is a given and implements thousands of different use cases, mass market cloud based live TV transmission is still in its infant stage. When it comes to broadcast TV, the main parameters that define technical feasibility are latency and peak traffic capability. Latency is a generic reason for customer dissatisfaction since the consumers expect the fastest possible delivery for TV, especially when it comes to live events, like sports. Peak traffic is a phenomenon that raises the necessity for TV service providers to establish an infrastructure able to serve a large amount of TV subscribers simultaneously and with the same content. Cloud technology does not automatically come with low latency or with high transmission capacity. Originally designed for best effort Internet traffic and uncritical latency requirements, cloud technology in the past years had to undergo a certain development that made it for the challenges of TV transmission [5]. A Cloud TV Platform with a general definition is an end-to-end modular cloud-based Media Manager technology. This provides complete flexibility about how the content is delivered and provides further options to expand streaming services over time for example by adding additional target devices, live editing and social syndication for promotional purposes. An idea of the architecture of a cloud TV platform in the figure 1 is presented below [6].

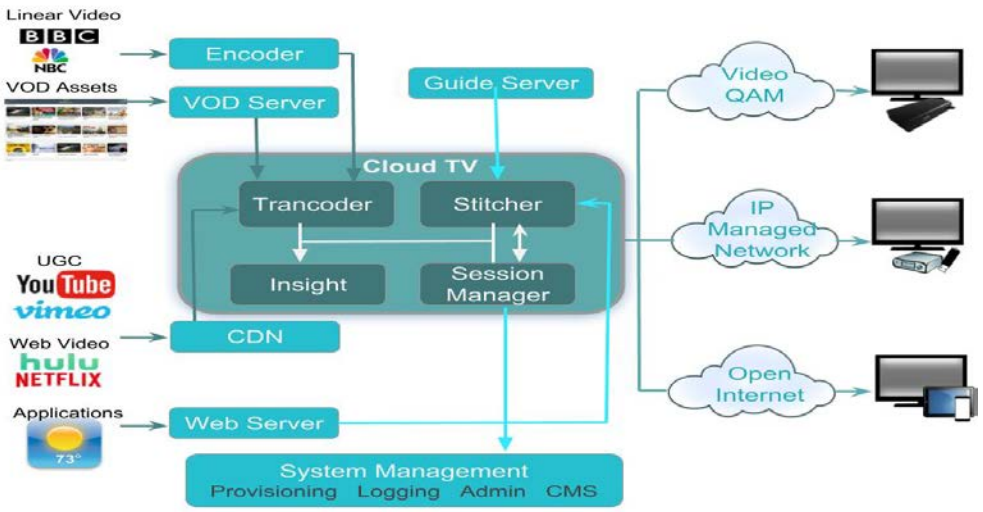

Figure. 1 A sample of architecture for a cloud TV platform

Cloud based Smart TV Technology

Smart TV is called the fourth screen coming up with PC, Pad and smartphone. With high market penetration, good configuration and network features, smart TV provides a broader platform for VOD applications. Legacy TV is gradually being replaced by Internet Protocol (IP) connected Smart TV, which offers more advanced computing ability and connectivity and allows users to install and run applications. Smart TV is called the fourth screen coming up with PC, Pad and smartphone. With high market penetration, good configuration and network features, smart TV provides a broader platform for VOD applications [7]. There are 2 challenges for the smart TV VOD such as load bottleneck and limited storage capacity. Conventional VOD system storage solutions mainly include Direct-Attached Storage (DAS), Network-Attached Storage (NAS) and Storage Area Network (SAN). The remaining problems include storage capacity, scalability, cost and complexity. Meanwhile, the rapidly development of cloud computing technology provides VOD services performance of Smart TV with improved load balance and massive storage capacity [8].

As observed in Figure. 2, the architecture of Cloud-based VOD services for Smart TV consists of content server, reverse proxy server, streaming servers, cloud storage and VOD client on smart TV. Content server is responsible for managing video resources in media source database and serving for end-users to browse information. Reverse proxy server could accelerate request speed with proxy cache integration. Streaming servers will stream audio and video files continuously. When a user plays a video, smart TV will send a request to reverse proxy server. Then, after receiving the request proxy, reverse proxy server will dispatch it to the one of the back-end streaming servers with lighter load. The streaming servers will obtain data from cloud storage and finally send it back to user-end directly without reverse proxy server participation. A proposed technique of cloud storage technology based on Hadoop Distributed File System (HDFS) solves the problem of mass data storage in VOD systems [9].

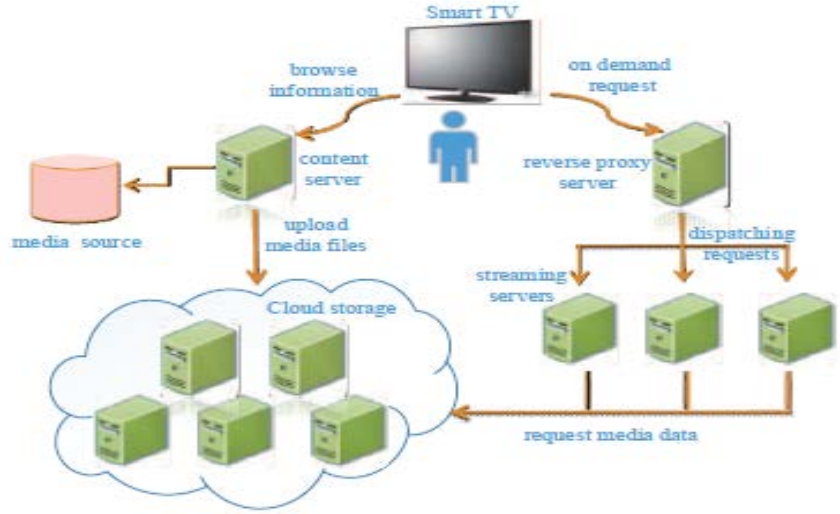

Figure. 2 An architecture of Cloud-based VOD services for Smart TV

Cloud based Technology for IPTV

IPTV is a service that provides television programming and other video content using the TCP/IP protocol suite as opposed to traditional cable or satellite signals. An IPTV service, typically distributed by a service provider, delivers live TV programs or on-demand video content. An IPTV system may be used to provide video content over a private network within an enterprise, despite that such implementations are far less common than subscriber-based The purpose of IPTV is to provide a cost-efficient alternative to the traditional TV system, allowing the distribution of different video content to end-users over IP networks and significantly reduce the cost of creating and managing different TV channels. Corresponding studies [10] have shown that the cost of IPTV services would be further reduced, leveraging cloud infrastructure. In contrast to the traditional TV channels that would need dedicated equipment and technical stuff, IPTV channels on top of the cloud will enable one simple user to manage many channels without the need for neither dedicated equipment nor technical stuff. Additional studies [11] have shown that instead of having guide/user interface functionality in the STBs, it is possible to move this functionality to the cloud. By using a cloud-based approach, CloudTV enables rapid, cost effective, and scalable introduction of a modern UI (and other applications) that bypasses the cost, scale and operational difficulties of STB based guide systems. The research was implemented by "ACG Research" for ActiveVideo [12].

Cloud based Technology for IPTV

OTT is a media distribution practice that allows a streaming content provider to distribute audio, video, and other media services directly to the consumer over the internet, via streaming media as a standalone product, bypassing telecommunications, cable or broadcast television service providers that traditionally act as a controller or distributor of such content. The operators have an aggressive timeline for new service launch, video quality is an important consideration, and there needed to be very low latency. Moreover, the operators want to be able to offer a skinny bundle OTT service at a much lower price. Given these parameters, many cloud TV vendors such as Harmonic and Mirantis partnered to deliver a cloud-native media processing solution on OpenStack that met these requirements, offering quick time to market, high video quality and minimal capital investment. Figure. 3 is an illustration of the OTT cloud workflow, used for cloud TV vendors like Harmonic [13].

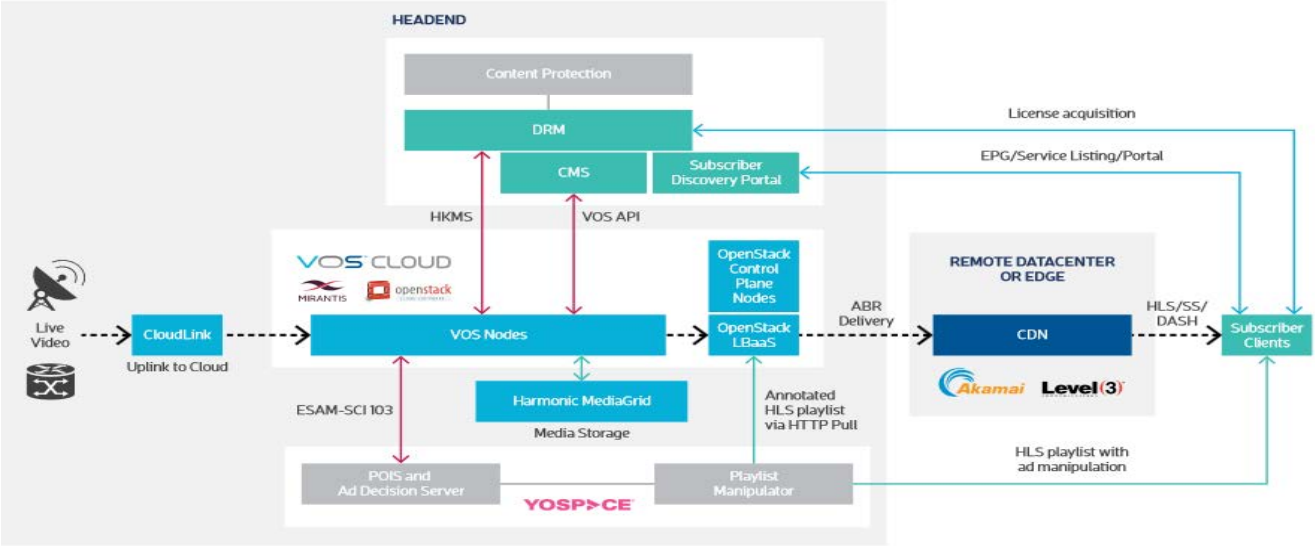

Figure. 3 An illustration of the OTT cloud workflow

Advantages and disadvantages of Cloud TV technology

The first and very important advantage of cloud TV technology is flexibility. A provider of television content that going to move their services to cloud has as basic criterion that vendor will provide flexibility of TV services. The basic factor for this criterion is that cloud TV provider will offer interoperability of different platforms of TV services, since there are IPTV platform, OTT platform and the Smart TV application. Another advantage of Cloud TV technology is portability. Portability is one from the basic

advantages that Cloud technology offers. Cloud TV provider guarantee the portability of services that offers in order to cover a wide range from different mobile devices (e.g. mobile smart phones, tablets) that customers use. There is capability to support different models of Smart TVs as well as different models of set-top-boxes. Also an important factor is scalability. Cloud TV providers are capable to support a wide range of TV channels by different content and provide a quantitative and qualitative extension of these services. At any time are able to increase their services without technical difficulties or weaknesses. The reduced cost to OpEx and CapEx offered by the cloud solution is also an important asset over a legacy solution. Also most vendors of cloud TV platforms guarantee a fast entry to the market.

As the main disadvantage of the cloud tv solution, is considered to be the long delay (latency) in live broadcasts (e.g. broadcasting a live football match). Also a negative factor for the cloud TV solution is the fact that the terminals are unmanaged as opposed to the legacy solution of an IPTV platform where the terminals STBs are managed and controlled by the provider. An important concern is the availability of the resources that cloud provider offers to support a rapid growth of business activity in the difficult area of Pay TV operations. It is an outsourcing operation which cause a lot of difficulties such as there will be too many dependencies. Finally an important issue is the security of subscriber data on all platforms, since the cloud vendor is responsible for this, with a number of negative examples that have been presented globally [14].

CLOUD TV TECHNOECONOMIC ANALYSIS

In this section is presented a market analysis in a global and local level, a forecasting analysis with real statistics from a Greek Pay TV operator. Also is presented calculation of the most important economic indicators, cash flows for 2 different scenarios and the billing method that has to be adapted.

Market Analysis

A market analysis and economic indicators have to be examined and evaluated. In order to offer an attractive TV service and become fully digitalized, the investment into head end equipment and operational costs could be quite high and may not be justifiable. Cisco predicts [15] that consumer internet video traffic will dominate other types of traffic by 2019, taking a massive 80% share of the global market, but add VOD and business consumption to the mix and the figures nudge their way up to the 90% range. Cisco defines 'Internet video' as short-form content (i.e YouTube, Facebook), long-form (i.e. Hulu), Internet-to-TV (i.e Netflix), as well as live-streaming, online rentals and purchases, and webcam views, and estimates that content delivery network traffic will deliver over half of all internet video traffic by 2019. Based on Ericsson's survey[16], An Ericsson Consumer Insight Report October 2017, about six out of ten consumers today prefer VOD to classic scheduled TV shows. The estimation is that in 2020 VOD will account for almost half of the total content monitoring time. Especially for people aged 16-19, VOD is estimated to reach 65% (and in Greece a very small percentage of young people now see classical TV). On the other hand, people aged 60-69 continue to see mainly scheduled television (80% of the total time devoted to this activity). There is a penetration of 79% among the US households. The penetration of Pay TV in Europe [17] will be 60% among the European households. In the next figure is depicted the penetration and the subscribers of Pay TV in Greece for the last years [18].

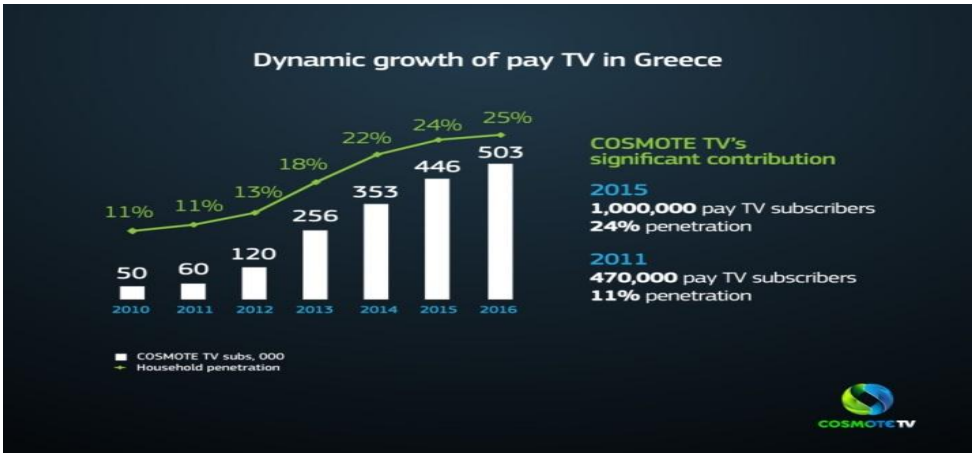

Figure. 4 The penetration of Pay TV in Greece

Around 950,000 subscribers are now in the Greek market, with Cosmote TV, Nova and Netflix now the monopoly. The great opportunity for the development of pay-TV in Greece, turnaround story betting on the Greek market and the increasing interest in

Greece for their content was seen by Netflix and decided to strengthen its presence in Greece, launching its Greek form. The prospect of pay-TV growth is great in the Greek market, as Internet speeds are rising, while overall market shares remain low, although they gallop. In a few years, 11% have reached 24%, but the European average (37%) is significantly lower [19].

Strategy Analytics performed a research [20] for different TV operators and devised a scoring process to assess and compare the selected vendor's strengths and weaknesses across the six dimensions that were evaluated in the previous section. Each vendor is assigned a weighted aggregate score based individual scores on a scale from 0 (very weak) to 4 (very strong) in each of the six evaluation attributes and weights assigned to each of these in order of importance.

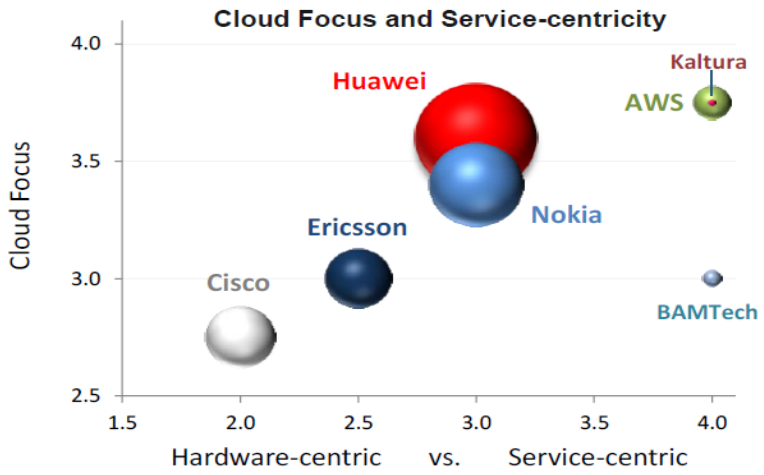

Figure. 5 Cloud Focus and Service-centricity by Strategy Analytics -2018

In the figure above, is shown that video platform vendors were rated across two dimensions on scale from 1 (weak) to 4 (strong). The platform vendors that are Cloud focus such as Kaltura, AWS offers the full range of cloud services including infrastructure (IaaS), platform (PaaS) and application (SaaS), cloud delivery rather than facility-based service provision. In the other way, video platforms like Cisco or Ericsson are legacy and culture is hardware-centric or software based.

Description of the new company

A description of the new company which will invest in Cloud TV technology locally (Greece) is described below.

- Company Name: Scopus TV
- Business Branch: TV Operations
- Object of work: Broadcasting, Rental, Sales of VOD / TV content
- Year of foundation: 2018
- Legal Form of Business: AE
- Cost of investment: € 6.000.000
- Staff: 70 persons
- Start number of Linear Channels: 32-35
- Start number of VOD assets: 200

The idea of creating a TV broadcasting company, based on Cloud TV, arose from the need to modernize the traditional broadcasting operations to the technological standards of today's digital world. The goal of this business idea is to enable the customer to access the TV content anytime, anywhere on any device. With the advancement of OTT services, like Netflix and Amazon Prime, and the proliferation of mobile devices as a gateway to access viewers' favorite content the ability to provide a cost-effective, multi-device, service that could appeal to its multilingual audience – and be built for a quick market turnaround – proved complex. Additionally, it was imperative for this TV services to be able to reach new audiences around the world that are not in a position to receive its channels or TV series through traditional TV distribution methods.

Forecasting Analysis

The very first step of a technoeconomic analysis is the forecasting of the diffusion of the service, for the years to come. This is usually achieved by adopting suitable aggregate models, which provide estimates of the future users. The present analysis was based on two of the most aggregate models, the linear logistic[21] and the Gompertz[22]. They are used to create a range - a zone between which penetration is expected to be recorded. Statistics for the following tasks were used by a long-range Greek Pay TV operator. Three years of subscriber statistics have been imported to Datafit and a 10-year forecast (40 quarters) has been made using the two models (Gompertz and Logistic).

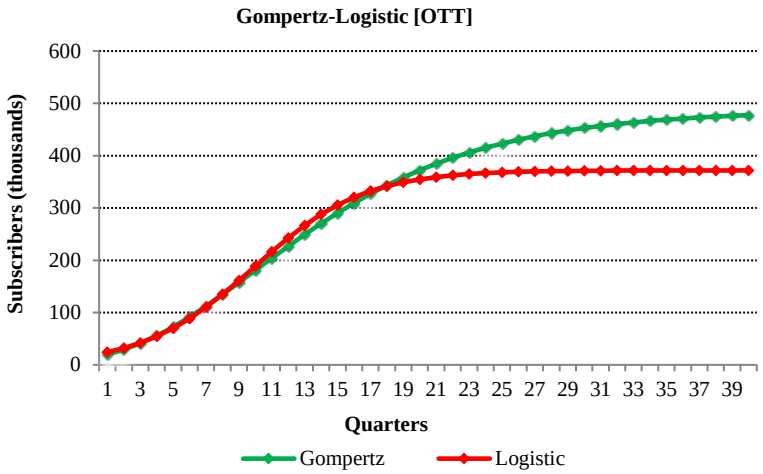

Figure. 6 Gompertz – Logistic models for OTT subscribers

According to the results illustrated in Figure. 9 subscribers levels for OTT services range from 370.000 (pessimistic scenario) to 470.000 (optimistic scenario) by the end of the decade.

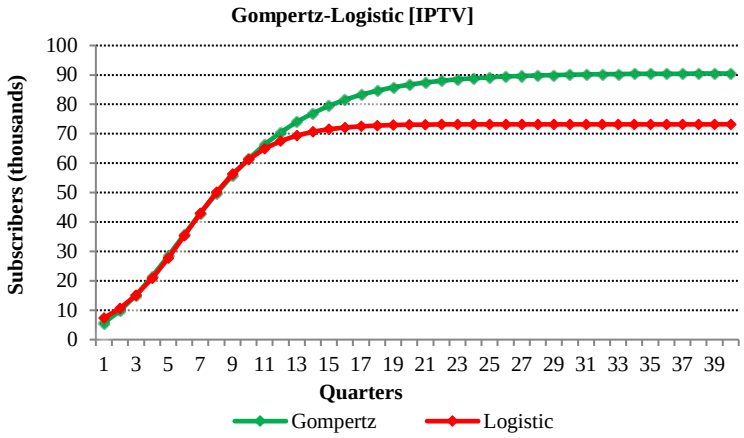

Figure. 7 Gompertz – Logistic models for IPTV subscribers

Figure 7 shows that subscribers for IPTV services range between 70.000 and 90.000 by the end of the decade.

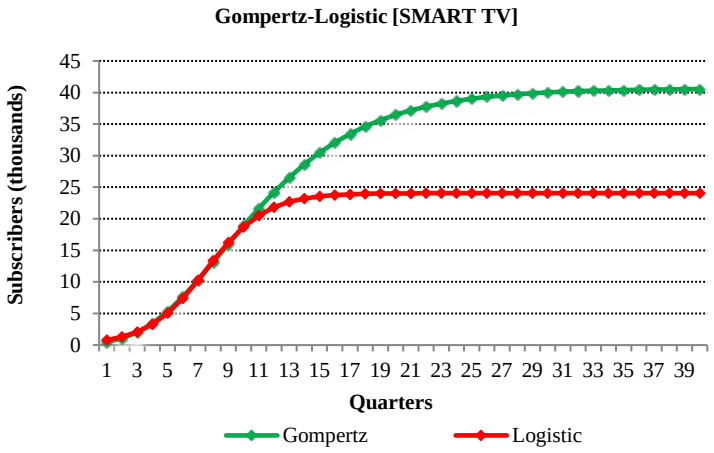

Figure. 8 Gompertz – Logistic models for SMART TV subscribers

Figure. 8 shows that subscribers for Smart TV services range between 20.000 and 40.000 (optimistic scenario) by the end of the decade.

Pricing

The offered services will be television services through an IPTV custom device that will be built exclusively for this purpose. Also, TV services will be provided as an OTT service, where subscribers will be able to watch TV content up to 3 devices at the same time. Finally, there will be an additional option which will be the Smart TV application. The company plans to establish collaboration with major smart TV companies, such as Samsung and LG. Therefore, customers will have three bundles / packages to choose according to their needs: IPTV Pack, OTT Pack and SmartTV Pack. In each case there will be the corresponding sub packets such as the Family Pack, the Sports Pack and the Full Pack. Costing of the services will be based on the fully distributed cost (FDC) approach, according to which a percentage of fixed common costs and a percentage of group costs that are not directly related (eg, company advertising) are assigned to the service. Pricing will be based on the penetration pricing model, offering high quality of services at a low price.

TABLE I: Packs for each technology

Technology Packs	Price(€)	Cost(€)
OTT Pack	16	6
IPTV Pack	16	8
Smart TV Pack	15	5
VOD	3	2

Implementation cost

The basic Fixed Operating Expenses are the cost for the Cloud vendor, CDNs, Linear Channels and Marketing for the construction period, as shown in TABLE II

TABLE II: Expenditure Analysis

Expenditure Analysis (thousands €)

	Start	Years									
Cost Category	0	1	2	3	4	5	6	7	8	9	10
Cloud Vendor [PaaS, SaaS,IaaS,App,SLAs]	1.580	0	0	0	0	0	0	0	0	0	0
CDNs	100	0	0	0	0	0	0	0	0	0	0
Linear Channels costs	750	750	750	750	750	750	750	750	750	750	750
Inhouse channels costs	700	0	0	0	0	0	0	0	0	0	0
Salaries	60	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260
Marketing	500	400	400	400	400	400	400	400	400	400	400
Rental of building facilities	-	0	0	0	0	0	0	0	0	0	0
Maintenance of production equipment	200	0	0	0	0	0	0	0	0	0	0
Movements	-	20	20	20	20	20	20	20	20	20	20
Expenditure to third parties	30	20	20	20	20	20	20	20	20	20	20
Other expenses	60	10	10	10	10	10	10	10	10	10	10
Total annual fixed operating costs	3.980	2.460	2.460	2.460	2.460	2.460	2.460	2.460	2.460	2.460	2.460
Total expenditure (operating costs & investments)	4.380	2.490	2.490	2.490	2.490	2.490	2.490	2.490	2.490	2.490	2.490

The Cloud Video platform expenses required for the construction period are calculated and presented in TABLE III. Services are divided into 3 categories. Frontend Services, Backend Services, and other services needed to build the platform. The total cost for cloud vendor in the construction period is 1.580.000 €

TABLE III: Cloud TV Video Platform Investment

Cloud TV Video Platform Investment (thousands €)	
Backend	
Online platform	600
Integration Services	350
Transcoding-Ingestion	50
COTS (commercial off-the-shelf)	30
Subtotal 1	1.130
FrontEnd	
UI/UX Design	50
iOS Apps	40
Android Apps	40
Web App	50
Samsung SmartTV UP	70

Android STB Client	100
Subtotal 2	350
Other costs	
IT cost for provising	50
Recommendation Engine	20
Analytics	30
Subtotal 3	100
Total	1.580

Cash Flows

The Cash Flows for 10 years of sales for optimistic (Gompertz) and pessimistic (Logistic) scenarios are presented in the below figure.

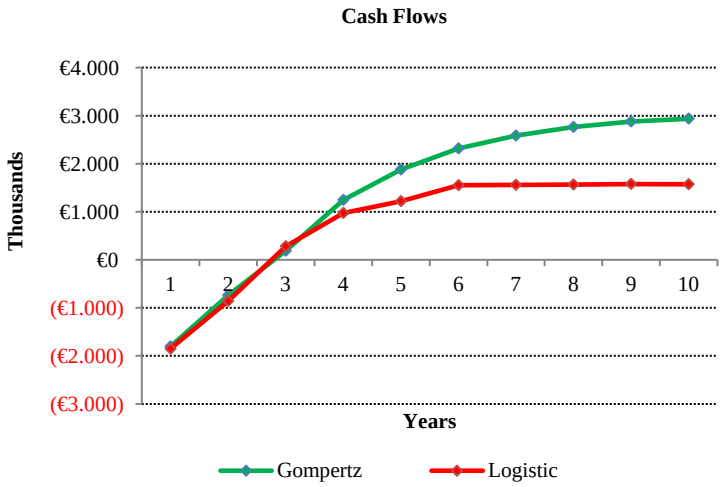

Figure. 9 Cash Flows

Economic indicators

TABLE IV: Economic indicators

	Years									
Indicators of 10 years	1	2	3	4	5	6	7	8	9	10
HPR (Holding Period Return) Total	HPR 1	HPR 2	HPR 3	HPR 4	HPR 5	HPR 6	HPR 7	HPR 8	HPR 9	HPR10
Optimistic scenario 2,40	0,28	0,11	-0,04	-0,21	-0,31	-0,39	-0,43	-0,46	-0,48	-0,49
Pessimistic scenario 1,32	0,29	0,13	-0,05	-0,17	-0,21	-0,26	-0,26	-0,26	-0,26	-0,26
HPY (Holding Period Yield)	HPY 1	HPY 2	HPY 3	HPY 4	HPY 5	HPY 6	HPY 7	HPY 8	HPY 9	HPY10

Optimistic scenario	1,40	-0,72	-0,89	-1,04	-1,21	-1,31	-1,39	-1,43	-1,46	-1,48	-1,49
Pessimistic scenario	0,32	-0,71	-0,87	-1,05	-1,17	-1,21	-1,26	-1,26	-1,26	-1,26	-1,26

Yearly HPR (Holding Period Return)	
Optimistic scenario	1,10
Pessimistic scenario	1,03
GM (Geometric Mean)	
Optimistic scenario	-0,67
Pessimistic scenario	-0,73
E(r) (Expected Return)	
Optimistic scenario	0,21
Pessimistic scenario	0,18
σ (Risk)	Σ
Optimistic scenario	0,58
Pessimistic scenario	0,42
PV (Present Value)	
Optimistic scenario	4.643.280
Pessimistic scenario	2.330.233
NPV (Net Present Value)	
Optimistic scenario	9.023.280
Pessimistic scenario	6.710.233
FV (Future Value)	
Optimistic scenario	12.043.473
Pessimistic scenario	6.044.025
IRR (Internal Rate of Return)	
Optimistic scenario	0,43
Pessimistic scenario	0,31
Payback Period	
Optimistic scenario	2,04
Pessimistic scenario	3,82

Break-even point

Break-even point is the exact amount of sales (turnover) that an enterprise covers its entire costs, fixed and variable, making no profit or loss. This concept is an important subject of study and goes into the sphere of sales analysis of a business. According to this method, the relationship between a business's variable costs, fixed costs of a business and its sales is defined as follows: Sales revenue = Fixed cost + Variable costs + Net profit. The sales revenue of a business depends on the product of the units sold and their price, fixed costs are not changed, and we have assumed above that the variable costs are proportional to the output of the units sold, the above equation is:

$P.X = F + AV.X$

Where,

P = The selling price of the product

X = Requested quantity of the product sold

F = Fixed production costs

AV = variable cost per unit of product

$P.X - AV.X = F \Rightarrow$

$X(P - AV) = F \Rightarrow$

$X = F/(P - AV)$

where, P - AV are fixed unit costs (fixed unit cost = unit sales price - variable unit cost).

In TABLE IV the break-even point (number of subscribers) is calculated for the different products.

TABLE V: Break Even Point for different products

Break Even Point			
X=F/(P-AV)	X=	159.900	Packs OTT
X=F/(P-AV)	X=	76.875	Packs IPTV
X=F/(P-AV)	X=	17.220	Packs SmartTV
X=F/(P-AV)	X=	73.800	VODs

According to the evaluation results, break-even point for OTT is appeared after 2 years of sales and 159.900 subscribers, for IPTV after 3,5 years of sales and 76.875 subscribers, for Smart TV after 2,5 years of sales and 17.220 subscriber and for VOD there is no break-even point for the first 10 years of sales. The OTT break-even point is graphically illustrated in Figure. 10 and Figure.11, since this is the most valuable technology for Pay TV operator to invest using the cloud.

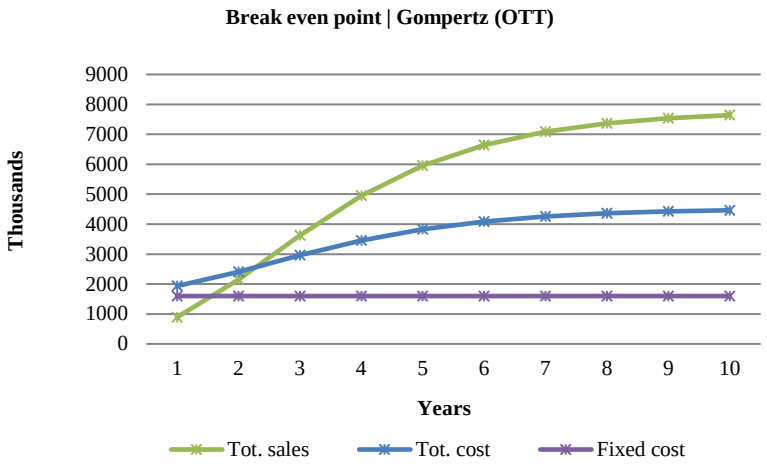

Figure. 10 Break even point for Gompertz model (OTT)

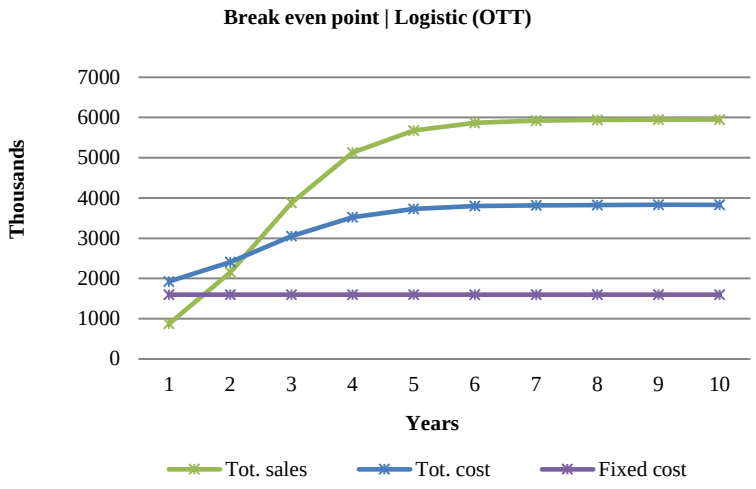

Figure. 11 Break even point for Logistic model (OTT)

SENSITIVITY ANALYSIS

In this section is presented a further more analysis taking into account the launch of a new similar service from a new operator

in this specific local market. Based on this scenario there is a need of calculation and examination of potential customer database reduction and the migration to the new Pay TV operator. This scenario which includes only the reduction of OTT subscribers that is the most valuable product and the new trend of Pay TV market, will trigger the operator to examine all the costs and the model pricing of products in order to reduce or avoid the loss of profits. The most probably assumption is the 20% loss of subscribers who will decide to choose the new competitor's TV platform. As a counter measure company has to reduce the price for OTT Pack from 16€ to 14€ in order to keep stable the percentage of reduction regarding to customer database. According to this hypothesis all the respective values such as Break Event Point, Payback Period and all the economic indicators are going to change. In the below figures are presented the Break Even Point, Payback Period and the values of the most significant economic indicators according the specific scenario.

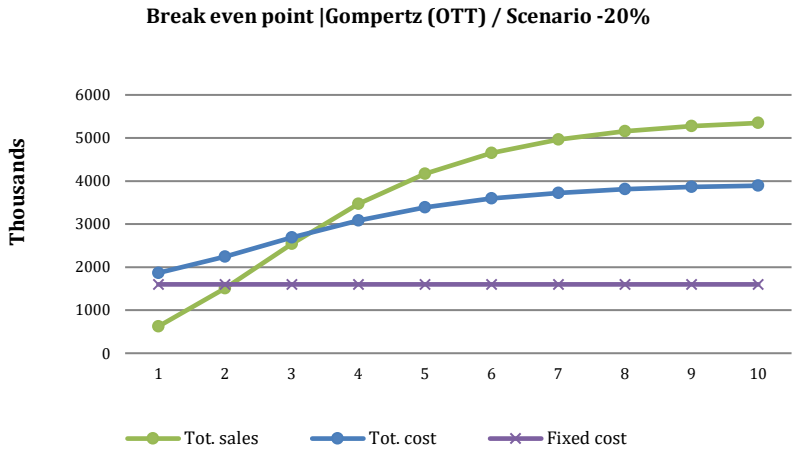

Figure. 12 Break even point for OTT/ scenario -20%

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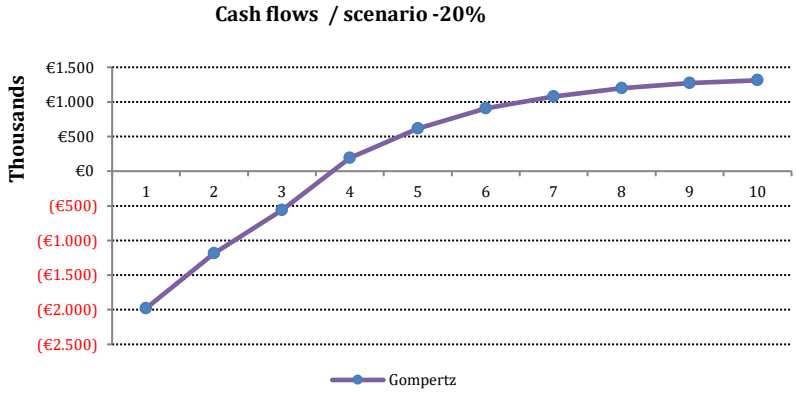

Figure. 13 Cash Flows for OTT / scenario -20%

TABLE VI: Economic indicators / scenario -20%

PV (Present Value)	228.177 €
NPV (Net Present Value)	4.608.177 €
FV (Future Value)	591.832 €

IRR (Internal Rate of Return)	12%
Payback Period	4,58

As observed comparing Table IV and Table VI the IRR has been reduced from 43% to 12% and the Payback Period has been increased from 2,04 to 4,58 years. However the investment is still valuable and this is a proof that OTT services via Cloud technology will be the state of the art in Pay TV market.

CONCLUSIONS

Since Cloud TV will play a key role in the IoT era and taking into account the current economic situation in the local and global market, competition (due to innovation) and the estimated response to the public, a techno-economic analysis of a Pay TV operator with cloud technology, was carried out for two cases, realizing an optimistic and a pessimistic scenario. According to the results and as depicted by the calculated indicators investing on this technology is worth. The significant further improvement of the key ratios of the financial statements, as well as the net profits that are expected to expand even further in the coming period lay the foundations for a dynamic presence in the sector. Cash flow tends to show a positive trajectory relatively quickly, the break-even point also appears reasonably and the expected return is 21% in optimistic scenario and 18% in pessimistic scenario. In addition, net operating income in the first two year is negative while in the 3nd year it reaches positive numbers.

According to the corresponding analysis, the cloud TV platform investment is a pay-as-you grow model, with multiple benefits. This model provides a fast time-to-market adaptation with low CapEx and OpEx and less staff (almost no engineering team) because all the necessary operation actions and tasks are performed by the cloud provider. Regarding the hardware, the company will only need a low number of equipment for some indoor operation and monitoring. As far as the opportunities are concerned, especially in Greece and because of the small estimated penetration (25%) there is space to evaluate and growth the business activities in Pay TV market. In addition the new regulation from the European Union that obliges broadcasters from 20 March 2018 to provide content portability in the EU. This is an important opportunity for new companies in Pay TV area for widening their targets group and their corresponding profits. In addition, there are many expectations of the development of TV services from the development and consolidation of 5G in many applications.

Furtrhermore and after examine the new entry of a Pay TV operator in the local market, the investment turns out to be still valuable even though there will be loss of subscribers which will cause a significant loss of profits. A topic that requires further research by a technoeconomic perspective as well is, the necessity of a proper analysis and the factors needed for a Pay TV operator, in order to decide which services will implement by a Cloud vendor in the IoT and which have to be excluded.

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