

## **ANALYZING THE QUALITY CRITERIA IN TV BASED ON INTERNET PROTOCOL TO EVALUATE AND MODEL THE IPTV ARCHITECTURE**

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### **ABSTRACT**

Advanced communicational services include a set of audio visual services and presentable data on IP networks which are considered as the new generation of presentable data in communicational infrastructures. IPTV is a kind of service which provides the ability of presenting multimedia programs in broadband network for users according to IP. Mutual relationship between users and service provider with high quality increases user's satellite communication with programs and also provides the ability to present diverse programs which makes this service more distinguishable than other services such as Cable TV, satellite and Digital TV and its one of the main factors according which we can explain why users prefer using this service rather than other existed ones. Because this network designers believe that regarding the IPTV place among other media, they pay more attention to the specific role of quality of services which are according to Internet protocol. Analyzing the quality of IPTV services using MPQM model is necessary. Advantages of this analyzing in IPTV systems include: customer satisfaction, network exploitation, impairment prediction, occasion identification and validation evaluation for acceptable circumstances of service level, according to this principal. Along with specific studying of the IPTV structure in this article, we will analyze the quality criteria in TV which is based on internet protocol.

**KEYWORDS:** IPTV, MDI, MPQM.

### **INTRODUCTION**

In 1969, Arpanet was established and a new era began in communication. After that, in 1983 Arpanet main protocol was changed from network monitoring protocol to transferring monitor protocol / Internet protocol and the internet was born. Internet and TV both lead to facilitate communication and trading. Mutual characteristics between them finally led to integrate these two technologies and forming IPTV internet TV. New technology of IPTV is a new generation of multimedia services whose presentation on IP network facilitates its presentation by speed internet services and voice as triple play services for users with lower prices, higher quality and more advanced facilities. (Zeadally *et al.*, 2011).

Although the application of video service is one of the main parts in IPTV, we can consider it as developed form of requesting video services which presenting it on IP network leads to increase the quality and also increasing the number of user's choices and this results in distinguishing this service from its previous samples which were presented on cable and satellite networks. TV systems which are according to internet protocol are different from TV broad casting systems which use transferring systems presenting different levels of operation. Broad casting systems are designed to continuous monitoring of transferring passages and package wastes. Analyzing the quality of IP TV services is necessary. Advantages of that include, customer satisfaction, network exploitation, impairment prediction, occasion identification and validation evaluation for acceptable circumstances of service level. Analyzing IPTV can be complicated. Because most of the related procedures which can reduce the media quality are used to control the media circuit. Internet protocol TV is getting spread. In one hand broadening the infrastructural of bandwidth and IP networks, market pressure and more competitive environment and in the other hand service movement and subscribers demands towards digital convergence lead to accelerate this procedure. In this situation, taking advantages of its own powers and natural benefits such as people long term acquaintance of TV and increasing development of adding networks available to bandwidth, IP TV can turn to one of the most popular and spread services in digital era (Johan, 2008).

### **IPTV ARCHITECTURE**

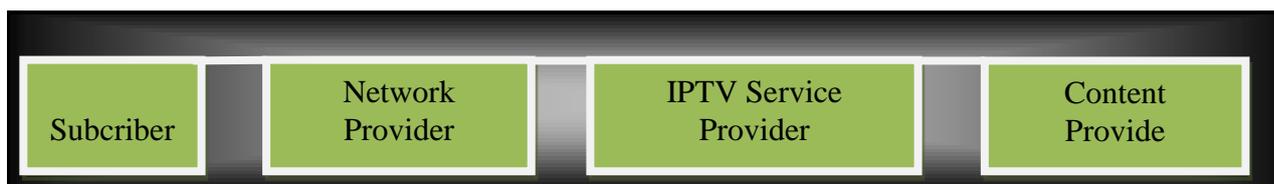
IPTV is a new technology that has provided more flexibility to manage the content, facilitated direct access to the content resources and improved the feedback and latter programming. The possibility of better control over the kinds of existing content like the mutual relationship with content providers leads to the remarkable improvement in customer experience (Weitao *et al.*, 2012).

IPTV is a way to transfer throughout traditional broad casting channels to the viewers via an IP Chanel instead of land broad casting, cable TV and satellite. Although IP is used here, internet in its general concept doesn't play an important role. In fact IPTV services are transferred exclusively via private IP channels just like those are made by telecommunication companies in the U.S.A receiver is installed in costumer's house to receive IPTV signals and change them to standard video signals which are show able on costumers TV. Since IPTV uses IP just as a mechanism to transfer, IP can be used to different kinds of content via internet and private networks which are based on IP. (Johan, 2008).

All internet TVs send videos via IP networks but it doesn't mean that any video which is sent via an IP network is internet TV. In this case the term "Internet video" is better. Sample of IPTV content can be very divers, from music videos to TV shows, movies, rock concerts and a lot of specific programs like boxing contests, succor matches and even broadways. It means that our summery definition of IPTV covers a great density of potential and exciting activities. Some of these activities include loading a movie or music video via internet to watch at the same time or later or taking part for a TV service which is transferred to the owner's house via a private network that transfers TV programs by IP. So, the term IPTV doesn't limit the content to what is broadcasted via public traditional TV s and it also doesn't mean transferring the content via internet formal approved definition by international telecommunication committee, IPTV is a multimedia service like TV, video, audio, text, graphic or data which is transferred by channels that are based on IP and its necessary for it to have the quality level of service, security and the ability to be trusted. From a service provider's point of view IPTV is to receive, process and secure transferring of video content via network infrastructure based on IP.

### High Level Architecture

High level architecture of an IPTV environment includes 4 main blocks each of them having specific functions. These blocks include; content providers, IPTV service providers, network providers and subscribers. Main elements of IP TV environment are represented in figure 1 (Zeadally *et al.*, 2011) .



**Figure 1. High level IPTV Environment**

Although content owners are out of limitation of our project, they are vital elements of IPTV ecosystem and in order to guarantee a secure interaction between IPTV service providers and content owners, we should take advantage of security mechanism. First block is content providers which can be some resources related to the text. The most common and popular content providers in trading IPTVs, Hollywood studios and in entertainment networks that sell packages containing diverse content to IPTV service providers. In some cases, the content is broad casted via satellite which has a spread geographical coverage and IPTV service providers have to install satellite receivers. Local content can be published via cable land or air broadcasting. There are some scenarios in which, content service providers, send the considered content by in a coded from. This makes the procedure simpler and reduces the complexity. Second block is made of TV service providers. They are in the charge of the content resource, changing that to the IP content and sending that to the subscribers via network providers. IPTV service provider's together whit content owners compromise if to send the content in a free way or to prevent unauthorized access to send in a coded way. They also compromise if the video or requested content include DRM (Digital Rule Management) protection to prevent reproducing, copy and save or not. IPTV service provider receives diver's content and it is necessary to change them to digital video circuits to be sent via networks which are based on TCP/IP protocol. During this changing process, main content is changed by coding devices to make a signal with less bandwidth. When the content prepared, IPTV service providers send the content to the subscribers through the network providers (Zeadally *et al.*, 2011).

There is permanent interaction between subscribers and IPTV service providers which is held by network providers, but any way it doesn't mean that the IPTV service provider's existence and network providers should be the same. Network providers are responsible for figuring out the situation, updating and monitoring the IPTV service providers. One of the advantages of IPTV is that as soon as any requested bandwidth prepares. You can use any network which is based on IP. This is visible in mobile networks in which subscribers receive the content through the limited bandwidth on the cell phone. Another flexible feature of this service is that IPTV service providers can use several network providers to send the content to subscribers. According to the market circumstances and subscriber's expectation, we can use different networks to transfer the content. Subscribers are the final element of this infrastructure. They own specific equipment which is figured out to receive, interpreted and displayed the content which is sent by IPTV service providers. Subscribers are the most valuable investment for IPTV owners and there should be mechanisms to support them (Simpson and Greenfield, 2007).

### Calculating Server Storing Capacity

Servers which are applied in TVs based on internet protocol are shown in table 1, (Hjelm, 2008).

**Table 1. IPTV Servers**

Video servers	HEADENO servers
Live shows servers	Public show servers
Advertisement servers	Archive servers
Live shows servers	INGEST servers
Production servers	Management and statement servers

In order to calculate the amount of needed storing space for a VOD server in an exact way.

We should know two factors:

- The number of stored content hours
- Bite rate of video signal

Having this information, calculating storing capacity will be fairly easy. In table 2, several samples of the size of video servers needed for different amounts are represented.

**Table 2. Server storing capacity**

Content	Bite rate
200 hours SD content	Bite rate 210gb-2.5mbps
500 hours SD content	Bite rate 900gb-4mbps
1000 hours SD content	Bite rate 900gb-2mbps
300 hours MPEG..2HD content	Bite rate 2TB-2mbps
500 hours H.264 HD content	Bite rate 1.35-6mbps

### IPTV NETWORK DISTRIBUTION TECHNOLOGY

It seems that IPTV, in its way to be a popular device to transfer digital TV services to the costumers is doing great. Because of the TV nature, there is a need to have distribution network with a high speed to support the transferring of the content which is based on IP. The purpose of this network is to move the data bite among IPTV users. Thus data center which provides IPTV service is necessary. This is done such that it doesn't affect the quality of video which is transferred to the IP TV subscriber, and it relates to each IPTV provider to decide on the kind or the skill of the architecture for needed network to support IPTV service. Several broad network's such as cable system, wire and wireless phones and satellite networks might be used to transfer developed services of IPTV network in the last part of the network (Weitao *et al.*,2012).

### Different kinds of bandwidth distributing networks

One of the primary challenges which IPTV provider's fact is to provide adequate bandwidth capacity in a part of the network that is between central skeleton and width user house. There are different methods of accessing bandwidth networks which are scalable based on specific sizes to provide necessities bandwidth in IPTV All of these are shown in table 3.

**Table 3. Different kinds of bandwidth distributing networks**

Via a network which is based on the satellite
Via a fixed wireless bandwidth connection
A structured network with fiber
Via cable TV network
Via DSL network
Via internet

Both IPTV and internet video services need adequate bandwidth in network. Without having adequate bandwidth, loading internet videos will be too slow and live representation of videos won't be possible at all. Without having adequate bandwidth, IPTV can't send the signal. So, being sure about the existence of adequate bandwidth is very important to guaranty the quality of service. Operators should make sure that they have adequate bandwidth in their DSL infrastructures. As fire to compete with cable services needs to make an equivalency between fuel, heat and oxygen, fequired elements for IPTV costumers are the equipment, services and network content. The band width is also like a spark which leads to start burning. Without knowing how to provide adequate bandwidth for data packages, service quality will drop and customers won't spend money anymore. Related standard is presented by traditional TV services, a listener can bear a dropped pixel or voice problem but he might not bear frame freezing and bad quality. Among primary solutions to improve the bandwidth which we discuss about it later, is to use DSL technology applying with higher bit rate or wide scope, compressing files and applying strategies like building near and far terminals to home. Required bandwidth scope for to transferring and sending services change from low for web pages and voice, higher for high quality TVs and super high for HDTV which should show one or two million pixels and it also needs a bandwidth is at least three or four times wider than required bandwidth for SD. it means 12 to 15 mbps. Although compressing standard like H.264, MPEG-4 reduced this number to 6-9 mbps, there is still a gap between updated ideal state and technology reinforcement such that whole the content is sent to all destinations adequately. Future winners in the case of industry are those who can calculate the best price ratio to the efficiency and can provide a unique service. Required bandwidth not only depends on the kind of sent content but also on it the connection quality. In 1980, 2400 bps modem speed enabled text sending. Soon after that reached to 128 kbps by ISDN technology, but this speed was not again adequate to send multimedia content. Today, the average of DSL line speed is 1.5 Mbps and higher speed like Mbps 6 and even higher than that is access able in cable modems.

### IPTV in a fiber Accessing network

Increased demand to bandwidth with low performing expenses and more security toward the electromagnetic interference are same factors which lead to increase the accessing networks which work based on light fiber. Networks which use fiber are used by multi operators to make networks for decades. Because of recent reduce in equipment expenses and spreading over a few past years, the interest to use fiber based networks to transfer new services bast on IP like IP TV have increased. In addition to this, fiber connects providers and consumers by a specific connection which is suitable to transfer IP TV. Providing fiber technology and high capacity of bandwidth which is nearer to user can be done by one of the network architectures like fiber to local office, fiber to the neighbor, fiber to home (seung and Xia, 2012).

### IPTV in the Next generation of coble TV networks

To connect media to each other, drivers technologies like wireless, or coaxial cobiles and CATG are used residen gate is permanently installed in a central place in a houses. Then IP traffic is traced from this gate to any STB (receiver) available at the house. In some systems, connection of this gate is also provided for costumers' phone and computer coaxial Cables not only are used at homes but in cable TV industry to support computer networks such as Ethernet. These cables are valuable because they transfer more data and provide more clear signals. CATG cable is most used at homes but they are the best choice for future. Cable TV operators have invested a lot to update their networks in order to support developed telecommunication services like IPTV. In order to understand the content transferring of IP TV in

cable TV networks and to give a meaning to this technology at first it is required to review the principals of hybrid fiber networks and traditional digital TV transferring technologies (Johan, 2008).

### **IPTV in Satellite Based networks**

IP is appearing as a kind of preferable way to distribute visual content via satellite links. Satellite links can provide higher bandwidth than land transferring networks and they also can be used for triple-play service which are based on IP and all together make digital visual content, VOIP and access to high speed internet. A lot of satellite networks have started using satellite based network marker plot forms to transfer IP visual content to the cable distance head ends and IP TV data center. Behind the structure of this network maker which is used to support this IP TV distribution mechanism, the main content is received, collected, coded to MPEG-4, MPEG2 or windows media format and is hidden from visual operation center. When its' proceeded in processing operation center, then it is sent to the satellite and then is sent to different hubs. These visual hubs are usually proceed by distance or cable telecommunication companies and then they use their own available network maker structure to transfer IPTV services to subscribers in different residential areas. Currently there are different options to transfer IP TV service to customers.

### **ANALYZING THE QUALITY IN INTERNET PROTOCOL BASED TV**

That's true that IP TV is the strategy axis of triple-part broad casting for a telecommunication company, however, you should bear in your mind that, there are other services that develop triple-part broad casting package. Such as audio, video phone and access to the high band width internet. These services should compete with each other for the network band width (Gyu *et al.*, 2009). Different protocols and service. Quality procedures might act together in the service quality area and also with the same control, and services usually act and cooperate with each other by new and unpredicted methods. Because of this it's required that telecommunication companies gain the experience of practical and functional service quality about how triple-part broadcasting service infrastructures will work as a associated solution. In this state service providers not only can guaranty that IPTV service can work the best under pressure and heavy load, but also can guaranty this about other services.

### **Moving Picture Quality Metric Model proposal**

MPQM (Moving Picture Quality Metric) is a kind of logical measuring system which can make a logical experience in a viewer. MPQM system can make such experience without paying attention to any reasonable and predetermined results in a person. In contrast, above system is built open human visual modeling in which we can refer to the following.

- Human eye's primary cortex never system reactions are limited and it has such mechanisms that balance and set what is observed and understood.
- Balancing and setting observations are done after receiving them via produced channel through spatial frequency of spatial directions and temporary frequencies, and these observations can be considered independent in primary calculating.
- Observations through each of the channels are considered as a kind of non emotional reaction which has their own specific.
- Observations through each of canals are a kind of hiding function which are considered as problems and inter-stimuli inter faces.

Tree spatial frequency, four location determiner frequency and tow temporary frequency for considered signal analyzing are used in MPQM; this filter is determined and specified to code pictures. After doing considered analyze, observing and understanding model is performed. This scale is also considered as the center of paying attention to time and place. These calculations are performed in 3d designs and frames of picture sequence and then above quality measuring scale is displayed.

### **Introducing Media Delivery Index Model**

MDI (Media Delivery Index) is a specific identifier method whose ability is developed and spreader in networks which have QOS (Quality of Service) part. It can be predicted about such networks that whether these networks are depended to the capability of on time playing of chain pictures like MPEG pictures or not. To determine and specify the required buffers in costumers' problems we can use MDI. Components of MDI include, delay factors, pictures' value rate, quality level or reduced waves of pictures, receiver and sender's wave different rate which all are measured in specified seasons in short term applications. MDI information is generally set for a long time at the end of time seasons then they

got renewal and updated. This time distance can start from a suitable period to probable existence of differences and predicted disorders of the network during fault – finding and till an unlimited period for monitoring, observation and recording is increased. Most of the programs usually put picture correctly in performing buffers and then they can operate. Correct quality signal is to see the pictures such that they are played or broadcasted not in the way that receivers, receive them. That means, deficient pictures which are shown in a correct way should not be considered in MLR, but those pictures which are received in suitable way but with delay are in MRL. However MDI just has followed network powerful structures. In spite of all that, we want these criteria to be used in picture quality evaluation to determine networks and users.

### Comparing MDI and MPQM

Numerical criteria of MPQM interpreted as a method to measure pictures in coding and considering the maximum signal and existed parasite and it's analyzed in a real laboratory. MDI is a tool to measure network reaction considering real time of picture broad casting. MDI scale performs user picture evaluating in a non-perceptual way and its very probable that it be to identify and specifying the quality of picture broad costing against low quality pictures which include non-specified codes non specified mode of waves or fixed controlling technique and without error growing up. MPQM scale measures this case in picture broad casting that whether above pictures are the results of coding process and transferring via network or not. Some information are probably deleted which can be the result of high density, canal deleting or delay in broadcastings that occur after preparing picture. If we want to use picture evaluating scale in the broadcasted picture quality measuring from the network, above scale should work as the same from in facing with any kinds of random of data's it should be similar to real experiments too. MPQM has shown that it works well in facing with existent errors in transferring pictures. If the board casting picture collection was improved or corrected via transferring to the picture fault or coding, then there will be a contradiction between MDI and MPQM, such that MDI report talks about the lack of picture quality, while MPQM reports the quality in a suitable way.

### ANALYZING THE QUALITY CRITERIA OF IPTV WHEN IT'S FACED WITH MISSING DATA IN THE NETWORKS

The amount of network deficiency and picture vibration are different in relation to the picture quality. Even if all mechanisms of picture coding were done in the considered content of the pictures and also were done at the same time. Then the existed difference in network mechanisms just lead to different packages of pictures that all will be destroyed. Different packages of pictures are different in their content. It is not possible to predict the picture quality in foalt and parasite paint of view. Effects of network different mechanism are very important, especially when the location of common mechanism like picture transferring circuit, capacity control, Diffuse, RSUP, content conformity and picture distributing networks, proksi receiving is considered. Missing some parts of picture and coding information lead to important effect in final picture figure 2, categorize the effects of picture missing and coding information from not important to very important, which the most important one effect the picture in short or long term associated to the mechanism and coded criteria and also how to transfer and picture broad casting. Decoders use error and problem hiding mechanisms which can reduce or omit the missing data in visual data.



**Figure 2. Coding quality measuring errors via MDI (left) and MPQM (right)**

These pictures can work in 50% of objectives and bandwidth of considered critters of network, but in more compressed pictures, pictures whit less firmness in transferring regarding high quality, this number is too high. Figure 3, shoes that regarding transferring and coding state is received without any problem and then is broad casting, MDI cannot cover these effects. In addition, a lot of experiences have shown that function measuring and picture transferring techniques

via the network in which a little waves are destroyed is impossible and the results are obtained from function criteria that is based on MOQM quality coding quality measuring errors which is done by MDI is a reference of the picture which is broad casting and some of its parts are missed. But as you can see, ARQ, FEC continues picture transferring and hiding coding error, and have improved all wall difference. In this case MDI evaluating method can report missing the quality and because of reduced waves can be in appropriate, while MPQM is able to report the good quality of the picture. In this case quality drop is both because of coding and the network. MDI ability is just limited to detect and reporting the quality drop. It is along with the ignoring all existed obstacles or parasites which get a better condition due to the network drop. MDI scale is a network best tool which is not informed of the importance of its picture packages and the broadcasted pictures, so it can't suggest any thing about the coding quality. On the hand, MPQM attempts to measure the pictures' quality from the other hand, MPQM attempts to measure the pictures' quality from the users' point of view in which coding law quality effects the picture effect. MPQM is the only scale that can follow the real results which are related to coding.



**Figure 3. Experimental stages**

## CONCLUSIONS

Communication world and information making is changing in a high speed and today we observe their convergence more than past, in such a way, data and information is sent to all parts of the world rapidly and they are available to consumers. In this situation, IPTV leads to vanish the borders of broad casting and telecommunication and internet protocol services are a chance to broad cast content. At present study we have detected existed architecture for an IPTV system. In this phase at first we look at the IP TV architecture and hardware tools which are used in IPTV then we evaluate the way of evaluating the internet protocol based TV service in the second phase of this article, studying some of introduced architectures, we analyze and evaluate IPTV when its face with missing data in the network and we also have evaluated MPQM and MDI models among which MPQM criteria was confirmed. MPQM model is to evaluate picture quality based on the visual model in human and MDI is a method based on network monitoring and supevisoring and we finally concluded that when the goal is to evaluate the picture quality, it's about sending and receiving the pictures, so the best choice is MPQM, because in this model coding which leads to the quality drop and compressing pictures is calculated and reported. In transferring and sending MPQM pictures, MPQM is the only method which can make suitable guide in foalt- finding based on mixed function from picture and the network. Table 4 is about the feature, advantages and disadvantages of both MDI and MPQM. It is important to note that each method's being suitable in different situation is mentioned.

**Table 4. comparing MDI and MPQM**

Explanation	MPQM	MDI
Users' ideo based quality	yes	No. it doesn't, network based ones
Relationship between above method with considered and logical experiments	yes	Its in the law level and it just pays attention to basic criteria
It considered pictures compressing	yes	No
It considered controlling and supervising coded errors and problems	yes	No
It considers developed transferring techniques	yes	Just when all above cases improved and corrected in all Situation
It considers coding and transferring setting in Pictures	yes	
It considers wireless networks	yes	

Presenting visual and TV services via computer data transferring fields is a subject which is considered recently, regarding the broad network bandwidth and computer network. So diver's models are represented to offer TV services via computer networks among which internet protocol TV is the most important one. The objective in IPTV is a movement from present TVSS to the new era of digital technology with high quality.

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