

OPINION PAPER

Playout Intelligence

**Generate winning margins
in the video on demand market
with end-to-end quality frameworks**

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1 Management Summary

Playout Intelligence ensures an outstanding, self-regulating end-to-end quality of audio/video streams for fixed and mobile end devices as well as anonymous or customer specific data mining capabilities as a CRM instrument.

Utilizing an independent seal of approval with strong brand recognition that guarantees reliable high quality audio and video content, a fair and transparent pricing model as well as innovative value added services for the emerging digital living room segment can be realized.

The resulting multiple-win situation for consumers, platform service providers, mobile service operators, content providers, and quality enrichment players provides a new fertile environment for the bright future of VoD, IPTV, InteractiveTV, Gaming, and other media-enriched experiences.

Combining the proven experience of designing business models and networks in converging ICT markets with the disruptive technology and service innovation directly from the heart of the Silicon Valley, Detecon invented a new framework for quality measurement and reliability. First pilot implementations in real-live environments were able to demonstrate the positive impact on new and existing VoD services, lowering OPEX and customer churn rates.

Playout Intelligence now.

2 Introduction

In order to find a unique selling proposition and to extend the market position in the (moderately) growing but already hard-fought German VoD market, we believe that key positioning factors for service providers will be a combination of a reliable playout quality with an independent seal of approval, a transparent and fair pricing model, as well as a variety of end devices served by the same platform (fixed and mobile). The German (high end) home theatre market and the set-top box market have more than doubled in the years from 2002 to 2004¹, with about a million customers in the home theatre sector and nearly 4 million customers with set-top boxes. Also the mobile VoD market is estimated to reach more than 8 million customers by 2009².

This all happens with support of Triple-Play (or even Quadruple-Play) models in a growing online access environment for the broadband segment (DSL, cable, WiMAX, satellite) and mobile segment (2.5G, 3G, 4G)¹.

The growth in VoD is not only triggered by the classical movie segment, the sports&news segment and the adult entertainment, but also by a growing number of female internet users which are more interested in e-learning and kids content³, currently not available at all or at the desired variety on TV. Note that i.e. the rural population (that suffers from a sparse evolved infrastructure to loan out video films) is expected to have the same (low priced) broadband access levels like the urban population in the upcoming years, likely supported by a strong push from the government⁴.

But customers will only be convinced to accept paid content if the quality matches at least their experiences with comparable media like CD or DVD. These media already carry quality seals of approval, to show that the content is appropriate for their devices in the high end and highly priced home theatre segment (i.e. 5.1 and 6.1 surround sound) as well as on mobile devices. A customer expects to be only charged for *perceived* quality on the display. As a result content providers and device manufacturers will only be attracted to extend their presence in the VoD market if the playout platform ensures end-to-end qualities.

As a consequence, to guarantee a certain quality, measurement tools and active control mechanisms have to be put in place to assess and optimize the data transport along the complete value chain, from content production to the customer's display.

Since current quality measurement methods focus only on the data transmission components and cannot satisfy real end-to-end video quality, we believe that a

¹ European Information Technology Observatory (EITO), 2005

² IDC Western Europe Mobile Voice and Data Forecasts, 1Q 2005

³ Jupiter Research European Consumer Survey, 2003 (Western Europe only)

⁴ Political discussions on „Bitstrom-Zugang“ in Germany in order to avoid a splitting of the society in rural and urban classes in terms of their ability to profit from online services due to a lack in infrastructural coverage

new, *holistic* approach including the elements of the whole video delivery chain – called *Playout Intelligence* - is needed to offer reliable services for the playout of high quality (premium) content. This enables and legitimates innovative pricing models in order to capture and tie the customer to higher quality and sticky services, lower churn rates, and to make lower-end service offerings profitable.

The end-to-end quality framework offers a lot of new benefits for all players in this market.

3 A New Approach

In this paper we discuss the customer benefits and the business opportunities for strategic partnerships of the players in the growing VoD market - or, more general, in the market for streamed high quality content the customers pay for - through the introduction of an end-to-end quality framework. We present the main ideas of this underlying framework and we show some interesting future prospects resulting from this new approach we call *Playout Intelligence*.

3.1 Playout Intelligence

Our *Playout Intelligence* approach can be understood as the combination of a high available playout platform with business supporting features – i.e. digital rights management (DRM), billing, data mining - and an interactive feed forward/backward quality framework for the *whole* video delivery chain – including the pre-processing, the encoding, the complete data transmission, the decoding, the post-processing and the display of the content.

This ensures an outstanding, self-regulating end-to-end quality of audio/video streams for fixed and mobile end devices, as well as anonymous or customer specific data mining capabilities as a CRM instrument.

The approach creates a stable platform for marketing instruments like independent quality seals of approval to attract customers and to strengthen confidence in the paid content services.

With this new holistic approach, the idea of an end-to-end quality framework generates a *multiple-win situation* for i) the customer, ii) the service (platform) provider, iii) the mobile service operator, iv) the content provider and v) the audio/video quality enrichment players, respectively, in contrast to currently used quality monitoring methods that rely only on transmission network parameters and a few playout server logging values.

3.2 A Multiple-Win Situation

3.2.1 The Customer

With the *Playout Intelligence* approach, customers will experience a stable VoD streaming quality for paid premium content - aimed at the growing home entertainment market - and even for basic services at lower bandwidths, i.e. mobile applications.

The quality framework legitimates the pricing models for the premium content and helps to increase the customer's necessary confidence level in the emerging online entertainment products. Customers will only pay premium prices for a guaranteed, measurable perceived premium quality. During our research and pilot deployment we showed that this need cannot be satisfied with measurement tools focusing only on the transmission network parameters.

Customers can be sure to get the best quality for their actually preferred end devices, i.e. home theatre solutions, multimedia PC(s), smart phones or cell phones. This quality is independently certified by well known and accepted audio/video quality enrichment players, as it is already established in the CD and DVD market.

Data mining from the various measurement and data collection points through the complete *Playout Intelligence* value chain helps to increase the service quality for customers and better fit the QoS and SLA needs of different customers for different content. While anonymized data is sufficient and helpful to evaluate needs and requirements of customer groups, the ability to gather more detailed customer data – if this is desired and implemented – regarding the preferences and technologies will enable a highly personalized experience without the need of a lengthy consumer questionnaire, simplifying the channel to the user. The results are a more focused variety of content and better (bundled) offers, perfectly shaped to his/her entertainment habits and end device technologies.

3.2.2 The Platform Service Provider

The development of an interactive end-to-end quality framework, understood as the backbone of future-proof VoD services, in combination with already existing platforms for playout, digital rights management (DRM) and billing to offer new *Playout Intelligence* services, is a new value proposition for the platform service provider. It enables the provider to take successfully part in the emerging market for high definition (premium) VoD content and to position himself as a reliable and innovative long-term partner for online content distribution.

Current quality control mechanisms begin with the playout and end at the doorstep of the customer, like a DSL modem or set-top box, hidden by the Network Address Translation (NAT) and firewalls of such devices. Neither does this pay respect to more and more interactive and reseller-like business models with various intersecting value chains like content aggregation and distribution *before* the playout, nor does it include the converging digital living room environment of the customer with various wireless, fixed, or peer-to-peer networks *behind* the customer's doorstep.

The quality framework's feedback and feed forward mechanisms offer significantly better resource management options for the transmission networks in terms of reserving, reducing or re-filling bandwidths, triggered i.e. by either the content itself or the current user experience. This helps the provider to optimize infrastructure costs, but also enables a more flexible value chain – with a common, shared, reliable, objective measurement framework. The risk of outsourcing or partnering gets minimized.

The exceptional and end device specific shaped quality of the streams, together with data collection capabilities will be a unique selling proposition in the yet poorly evolved but growing and already hard-fought online content market in Germany.

The integration of the *Playout Intelligence* idea could attract and *convince* more content providers to offer their content on the provider's platform. This will help to achieve better margins and therefore a higher profit for the provider.

The outstanding and measurable quality for the (popular) home entertainment services could also be used in general marketing campaigns of the provider to influence the return in other market segments.

Furthermore, as a side effect, the acceptance of paid premium services through a fair pricing model, based on independent quality seals of approval and the transparent surveillance of a powerful measurement tool, could also boost the market for broadband access and therefore the (core) business of the provider.

3.2.3 The Mobile Service Operator

Even if the offering of premium (high definition) VoD content is out of scope for cell phones (regarding the addressed time frame of this opinion paper), there is still a profit from the quality framework, because it enables the mobile service operator to enter the mobile VoD market with reliable service levels and a higher customer acceptance even at lower (UMTS) bandwidths. As broadcast technologies like DVB-H gain footprint and acceptance, MSOs have to bear comparison with these broadcast services and their own, personalized video streaming and download service offerings. While DVB is perceived as 'television', the current perception and connotation of UMTS IP-based videos with the unreliability and jerkiness 'Internet videos' with long loading times and drop-outs could destroy the dream of the killer application for UMTS.

Playout Intelligence could not only be a unique selling point in the mobile market, but also be used for marketing purposes to push other business models.

Moreover, the additional detailed customer profiles gathered by the platform can be used efficiently in CRM processes, to get more information about the used end devices and the preferred content in the mobile society to anticipatory adapt the content business models to a more and more tribal while individualized consumer community.

3.2.4 The Content Provider

It is a great interest of the content provider to ensure that the high quality of the offered content in premium services can be preserved in the whole video delivery chain, which can be assured by the proposed *Playout Intelligence* approach.

With the prospect of an independent seal of approval, the VoD platforms could convince the content providers to overcome their reluctance and completely open the door to the online market, since there is no “cannibalism” with the content provider’s other businesses, which would inhibit the whole VoD business model.

The content provider could also profit from the detailed customer profiles gathered by the service provider to adopt the content much better to the customer’s needs and to optimize the qualities offered to lower internal costs.

3.2.5 The Quality Enrichment Player

The *Playout Intelligence* approach could convince the quality enrichment players to join a strategic partnership and alliance with the service provider to generate new revenues by expanding their intellectual property and their brand to the online market, resulting in a greater market penetration.

Without a true common and transparent end-to-end quality measurement framework, a quality enrichment player can neither guarantee the delivery of the appropriate content to his certified user end device, nor can he ensure that his highly engineered content during mixing, mastering, or aggregation actually gets delivered in this form to the end user. *Playout Intelligence* lowers the risk for the quality enhancer’s brands from being compromised by all thinkable quality degradation scenarios along the complete value chain and the possibly resulting irritation of the customer.

Furthermore, in combination with the profiles gathered by the service provider, the quality enhancer is much closer to the customer in the online market, because the usage of the quality labeled products can be tracked.

3.3 The Quality Framework

The quality framework is a new measurement model, developed by Detecon, that covers the *whole* end-to-end video delivery chain, including the content, the pre-processor, the encoder, the transmission device, the transmission network, the receiver, the decoder, the post-processor and the display, in contrast to common performance measurements that concentrate only on the transmission components.

A chain element in this model accepts media data, processes the media data in some specific way, and sends the output to the next chain element. For example the ‘Pre Process’ element might scale or deinterlace video content and sends the altered media data to the ‘Coder’ element, which in turn selects the appropriate

encoding profile or media codec and sends the output to the 'Transmission' device, and so forth.

Every single chain element provides a set of changeable parameters and tweak attributes (denoted by vectors \mathbf{a}_n in figure 1). After processing, the output of each chain element can be measured by the respective downstream measuring points (denoted by vectors \mathbf{m}_n in figure 1). Each element is now able to receive and to send measurement information from or to any other element of the delivery chain and can therefore tweak and correct attributes relating to different quality parameters. Sending measurement data backwards to previous elements is called *feedback*, while sending measurement data forward to later elements is called *feed-forward*.

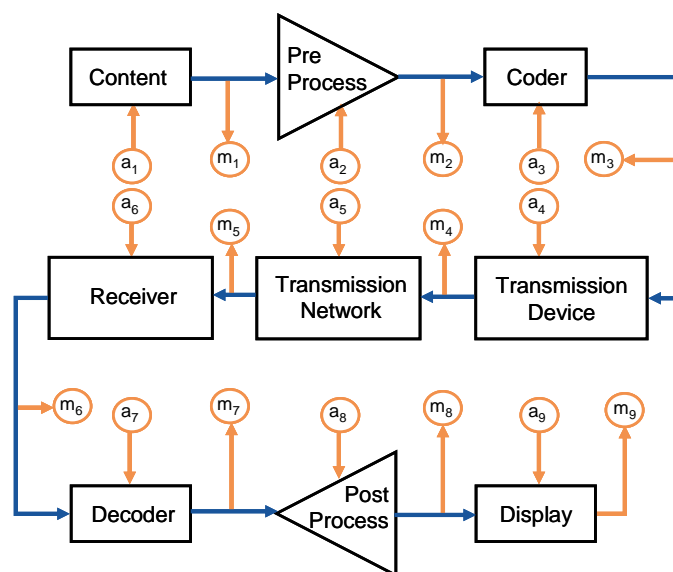


Figure 1: Schematic view of the elements in a generic video delivery chain covered by the presented quality framework with the *Playout Intelligence* approach. Each element has a set of vectors \mathbf{a}_n , that can be influenced by the results of quality measuring points, denoted by \mathbf{m}_n . The results can be pushed forward or backward, depending on the sense in terms of a positive impact on the video quality and the business in the VoD partnering model.

The attributes range from *image related* information (streaming formats, spatiotemporal features, edge detection, resolution, chrominance, contrast, artifacts, etc.), *processing related* information (frame rates, CPU load and available memory of the devices, etc.) and *transmission related* information (jitter, latencies, throughput and availability, packet drops, etc.) to *content related* information (subtitle and logo identification, MPEG-7 meta data, etc.).

In a study, Detecon found that only a reduced reference model with a *certain combination* of feed forward and feed backward scenarios makes sense in terms of a visible, positive impact on the video quality, the necessary trade-off with additional data streams to carry the reference information and the support of real business models.

One key finding of the study is that focusing on the sole assessment of transmission parameters has *almost no influence* on the experienced video quality in an end-to-end delivery chain compared to common real-world VoD quality degradation scenarios, as no or only limited actions can be taken – we know that the quality is bad, but we probably can't do anything about it (see figure 2).

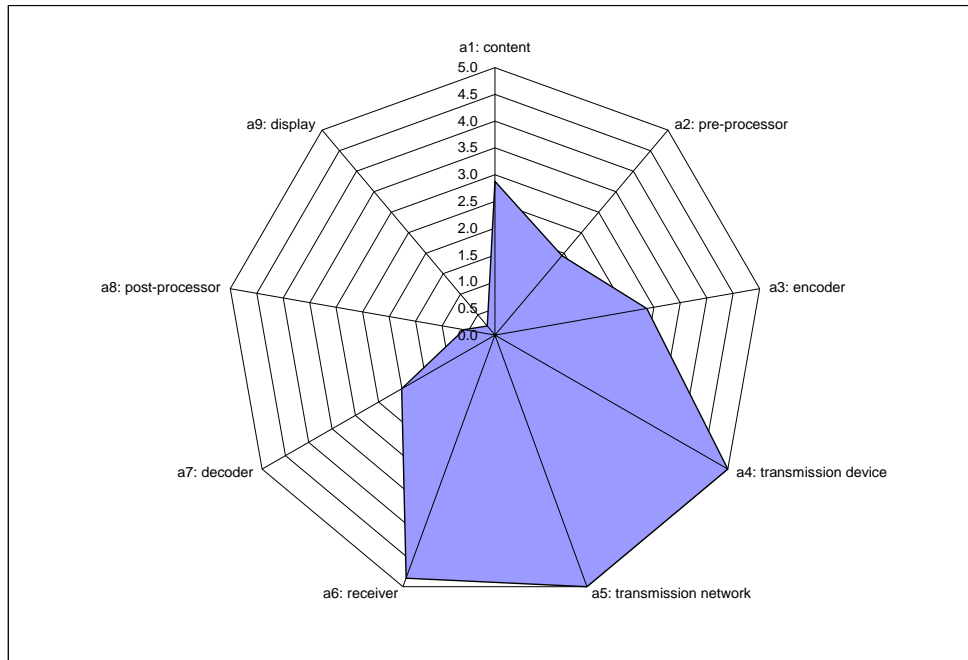


Figure 2: Example for a combination of feed forward and feed backward results of the measuring points m_4 to m_6 (the measurement points after *Transmission Device*, *Transmission Network* and *Receiver*) from the quality framework and their quality enhancing influence on the attributes a_1 (*Content*) to a_9 (*Display*) in the *Playout Intelligence* approach. The measurements m_4 , m_5 , and m_6 can be used to tweak the attributes a_1 to a_9 of all other chain elements for higher quality playout. The *Transmission Device*, *Transmission Network*, and *Receiver* element can be very well tweaked with the available measurements, while a direct correlation for quality enhancements with other chain elements like *Display* or *Post Processor* is almost non-existent. Though a reliable transmission of data is of course still essential for VoD, the measurements are less actionable compared to the total amount of options (this figure is taken from a Detecon white paper).

A prominent result coming from a combination of the measuring points m_6 (*Receiver*) to m_9 (*Display*) and their quality enhancing influence on the attributes a_1 (*Content*) to a_9 (*Display*) over the whole delivery chain in a feed forward and backward configuration is shown in figure 3. It shows the so far unrivaled complete coverage of the parameter space that defines the end-to-end quality of video streams, which could be reached using the *Playout Intelligence* approach.

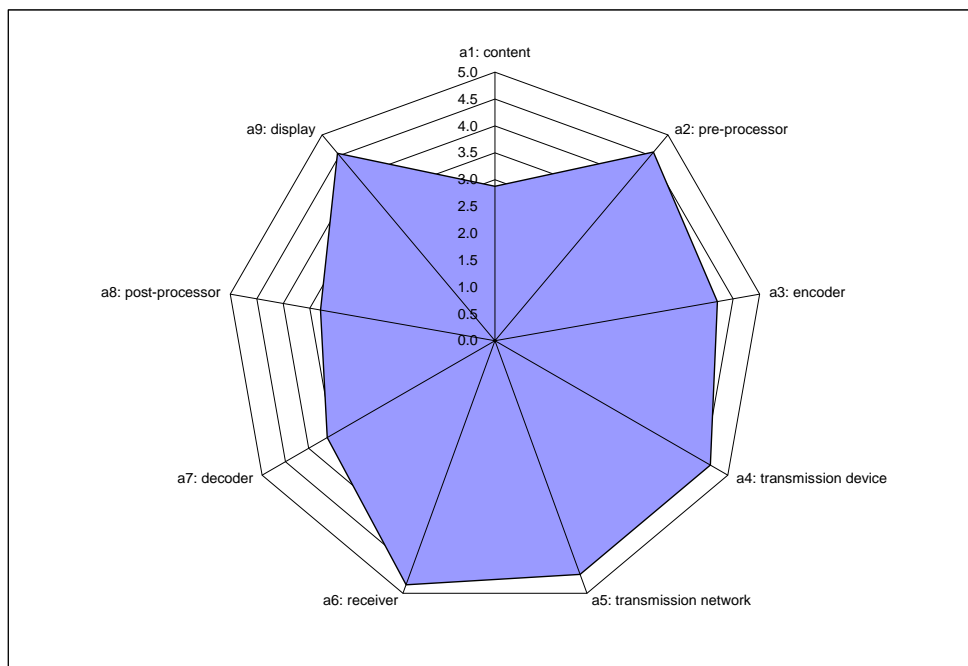


Figure 3: Example for a combination of feed forward and feed backward results of the measuring points m_6 to m_9 from the quality framework and their quality enhancing influence on the attributes a_1 (Content) to a_9 (Display) in the *Playout Intelligence* approach. The Detecon assessment reveals an almost complete coverage of the parameter space that defines the end-to-end quality of video streams, even though measurements in the transport network were not taken. However, the available measurements m_6 to m_9 were sufficient to make assumptions about the quality level of network and transmission device, which in turn allows us to tweak their quality attributes (this figure is taken from a Detecon white paper).

With two examples we show the potential of the presented *Playout Intelligence* approach:

3.3.1 Example A: Network Storm

Alarm! A denial of service attack aimed at the routers and the DNS servers decreases significantly the response time of the service provider's VoD broadcast network. What could happen within the *Playout Intelligence* approach?

The quality framework reports values for the round trip times, packet losses, latency times, dropping rates, CPU loads, and the memory usage. Together with additional information regarding buffer underflow and buffer overflow warnings the system begins to react instantaneous to the anomaly: all packets with high priority are marked, the receiver gets a command to extend the cache to avoid jitter (queue depth), the encoder is instructed to change the coding from VBR to CBR at lower values and to remove the quality seal from the end device displays, the billing system is informed to switch the billing mode to a lower price segment.

In this scenario the customer experiences a slightly decreased video quality without losing the stream, he is informed that the content is no longer available in the expected premium quality and therefore he has to pay less for this incident.

Furthermore, the framework gives a detailed answer to the originator of the quality distortion in the end-to-end delivery chain, as well as who is responsible for the quality degradation and the resulting loss of premium income.

3.3.2 Example B: Decoding and post-processor problems

The video quality decreases because of a CPU overload in the customer's end device.

The quality framework measures the CPU load and starts to inform the encoder to switch from 15 frames per second to 7.5, which is already negotiated with the decoder in the customer's end device. Additionally the video size is reduced to the half and filters are put in place to boost the smoothing (reduction of system complexity). Again the quality seal is removed from the end device display to announce a change in the billing mode.

4 Conclusion

In line with a variety of independent studies, we believe that VoD services for high quality (premium) content will be a profitable and steadily growing business model in the German market for paid content in the upcoming years, although it might not become the (only) killer application. But Telcos will only profit from this growth if the customer's demanding expectations concerning i) the content variety, ii) the quality, iii) the price and iv) the independency from location and end device can be fulfilled by the service provider *at once*.

We believe that one of the key elements to attract and convince customers will be a strategic partnership with *independent* audio/video quality enrichment players who can account for a certain quality level, visible by a well-known and accepted seal of approval to compete with the already established DVD market in the high end entertainment segment.

We also believe that the stability and portability of the video quality will be one of the leading selection characteristics in the consumer's choice for a long-term VoD service provider in the paid content market.

The presented quality framework within the *Playout Intelligence* approach will help the service provider to strengthen the confidence of the partners in the delivered quality and therefore in the VoD business models.

It will also help to strengthen the confidence of the customers in the pricing model for paid content and it will support the content providers to overcome their caution regarding the content placement in the emerging VoD market.

With the *Playout Intelligence* approach, service providers could take over technological leadership in the market and position themselves as a reliable and innovative long-term partner for online premium services. First pilot implementations in real-live environments were able to demonstrate the positive impact on new and existing VoD services, lowering OPEX and customer churn rates.

5 Looking beyond...

Beyond the first scenarios presented in this paper, the quality framework in the *Playout Intelligence* approach could in near future also play a central role for other applications in almost the same impressive multiple-win configuration:

- **Applications beyond VoD:** Once in place, the *Playout Intelligence* approach could be used to enhance the reliability and acceptance of other premium online services with high demands in quality like i.e. multiplayer gaming, conferencing and online home surveillance systems.
- **Seamless content roaming:** The recognition of end devices and available transmission network(s) through the quality framework, together with customer specific subscription profiles, would enable seamless roaming of content from one end device to another: i.e. from home theatre equipment to multimedia PCs, a digital video recorder or a smart phone, while automatically changing the billing mode as a reaction to a (possibly) resulting “non-premium” video stream quality.
- **Environmental feedback:** Some devices in the high end entertainment segment already provide display sensors to measure the surrounding light or sound environment in order to adapt contrast, brightness and frequency spectrum values. These sensors could also be used by the quality framework in a feedback channel to adjust these parameters early in the VoD content delivery chain.
- **Add-on information & advertisement:** The feed forward mechanisms of the *Playout Intelligence* approach could make it possible to use the cell phone or smart phone as receiver for (user controlled) advertisement, linked directly to the VoD content, but without having to be encoded in the same way. Thus, advertisement could be displayed in mobile device adopted qualities, independent from the VoD qualities. This is of course an interest of the whole marketing sector.
- **Peering of ‘quality’:** With an independent, recognized, common quality measurement framework, any available resources along the complete process chain (the nine chain elements) could be peered to other service providers, platform providers, content providers, or even by the end customer themselves: available bandwidth with a certain SLA could be measured and then priced according to the measurement. In case the quality drops, the measurements can clearly indicate the cause as well as the effect on the customer side, enabling a transparent and fair billing model. Consumers with broadband upstream capabilities and large storage availabilities on their DVRs could be used as quality-assured black boxes to deliver media-enriched experiences to their neighborhood, extending the reach and footprint of a platform provider even more towards the edge.
- **Improvements to the quality framework idea:** The interactive character of the quality framework, regarding the options of content adoption to the

end devices, could be used by the emerging generation of so called *layered* or *pyramid* codecs. Each layer could be measured and processed differently, spatial as well as functional as well as temporal. This would allow for example a hierarchical distribution content with transparent and objective quality assurance, allowing service providers to increase the efficiency of the resources for VoD services while using the quality framework output as a trigger.

With the feedback and feed forward character of the Detecon's *Playout Intelligence* approach, a lot of new applications in the (premium) paid content services field and with it new business and payment models are now thinkable, feasible, and become profitable.

6 The Authors



Christoph Hillemanns works at Detecon International as Senior Consultant in the Competence Practice Information Technology in Bonn, Germany.

After his degree in Physics/Astronomy at the *'Rheinische Friedrich-Wilhelms'* university, Bonn, and concurrent work experience at the *Microgravity User Support Center (MUSC)* of the *Institute of Aerospace Medicine at the German Aerospace Center (DLR)* in Cologne, Christoph started his consulting career at Detecon International in the year 2000.

With a main focus on IT infrastructure architecture and consolidation, multinational solution roll-out projects and IT service portfolio restructuring projects, he could successfully support large and medium international companies to optimize the added value of their IT and to develop new business aligned IT services in mergers, migrations and innovative 'green-field' approaches with emerging technologies.

He held several talks on IT security, IT infrastructure architecture and streaming media solutions on national and international conferences.

Former clients included Deutsche Telekom AG, T-Systems International, Süd Chemie AG, ISOVER, the Federal Ministry for Consumer Protection, Food and Agriculture (BMVEL), the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), DVB Bank, international consultancies, as well as international law firms.

Christoph developed and realized Detecon's internal corporate communication and corporate learning platform, called *ForumTV*, supporting a more effective information distribution and the virtual attendance of the Detecon consultants in the 'Detecon University' program with rich-media experience.

His current projects are in the field of enterprise IT security, covering security audits, public key infrastructure (PKI) services and the balanced integration of security technologies to immunize IT infrastructures and information against growing threats, as well as in the field of streaming media technologies that include the development and placement of new products and IT services in corporate communication projects, the broadcast market and the emerging VoD market.

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Thorsten Claus is Managing Consultant with DETECON, Inc. in the Silicon Valley, San Mateo, California. With over 12 years of telecommunication industry experience he is DETECON's technology evangelist and leads the *Media & Online* practice, creating innovative business models, service offerings and evaluating emerging technologies.

Current projects are in the fields of RFID for consumer solutions and supply chain management, sensor networks, grid computing, virtualization, streaming media, VoD, IPTV, InteractiveTV, codec innovation, watermarking & fingerprinting for superdistribution DRM systems, content post processing, next generation converged networks, service-on-demand architectures, business service registries, and multimodal eCollaboration and eCommunication, with a track record of successful prototype, pilot, and service roll outs for *Fortune 100* companies.

Prior to joining DETECON, Inc. he held a position as a Senior Technology Consultant at T-Systems Nova North America, where he was responsible for building up the *Software & Network Technologies* practice. He acquired and managed projects in fields such as service and technology research for next generation optical backbones, WLAN/4G technologies and convergence trends, business operation support system assessment, strategy evaluation and eTOM mapping for large telecommunication enterprises, technology and strategy consulting on the US media and online entertainment industry as well as analyzing architecture trends and security in VPN and dial-in access networks.

Before his assignment at T-Systems Nova North America, Thorsten worked as CTO for COSYNUS GmbH in Germany, where he was responsible for developing and deploying unified messaging solutions for large and medium enterprises as well as aligning IT infrastructure with business process goals. He held technical trainings for heterogeneous media-enriched client-server and client-client networks as well as assessed emerging and disruptive technologies and their impact on business processes and markets.

Before his engagement with COSYNUS GmbH he worked as a freelancer for the segment of unified messaging solutions and location-based services. Former clients included Swatchgroup, Robinson Club, HMInterdrink, Web.de, SAF Achsen, BASF, and Merck. Focus was analysis, streamlining, or design of heterogeneous enterprise communication solutions, enterprise CRM, Unified Messaging, backend integration of various mobile devices and services, development and deployment of collaboration software. He was project leader for multilingual, multinational solution rollouts, network planning, and SAP certifications for backend software components in Novell, IBM Lotus Notes, Microsoft Exchange and Tobit David environments. Front-end components included Windows, Unix, Linux, Solaris, PalmOS, WindowsCE and Symbian devices.

Thorsten holds a Master's Degree in Information Technologies with focus on Business & Management from the Technical University Darmstadt, Germany and can be reached at: +1 650 401 5225 or Thorsten.Claus@detecon.com.

7 The Company

Detecon International GmbH is worldwide one of the leading independent consulting companies for integrated management and technology consulting. Detecon's focus is on innovative consulting and implementation solutions which are derived from the use of modern information and telecommunications technologies. Detecon is the consulting partner for any company for which the ideal use of IT and telecommunications is an essential factor for the success of its business model. The line of services ranges from analytical and strategic topics to organizational and process consulting to support in the planning and establishment of technical infrastructures. With two headquarters in Bonn and Eschborn, four additional national and twelve international locations, together with 40 project offices, the consultants are represented on virtually every continent.

DETECON, Inc. is the subsidiary of Detecon International GmbH for the Americas. With the headquarter located in Reston, Virginia, just 40 minutes away from the Capitol and Whitehouse, other locations are strategically placed in the Silicon Valley (90 minutes to Hollywood) and Miami (a plane hop into the Latin American market), with outlets in Redmond and Mexico City. With its highly qualified and experienced staff (over 20 Masters and PhDs, 8 Bachelors in Computer Science, Telecom Engineering, business and economics), and more than 40 well networked professionals, the team is complemented by close advisors from key R&D entities including Stanford University, UC Berkeley, IBM, Daimler Chrysler, and Sun Microsystems among others. DETECON, Inc.'s services focus on technology consulting and innovation engineering services, management consulting, due diligence, market research and training for local and international telecommunication carriers, high-tech companies, government as well as for Deutsche Telekom entities. Throughout its long and successful presence, excellent market knowledge, in-depth expertise, and well-established networks with key players in the US ICT markets and in academic R&D, we were able to build deep and long lasting customer relationships, empowering our clients to do outstanding things.