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healthcaRe applications

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Executive Summary

This deliverable gives a summary of the dissemination and standardisation activities carried out during the first 6 months of CONCERTO, and most importantly, the related plan for the rest of the project life-time.

The dissemination part mainly covers the project web page (including some partner's sites references to the project), publications and participation at conferences, workshops, symposiums, concertation meetings and other ICT project meetings, as well as the organization or joint-organization of workshops about eHealth. The web page serves as a central information point for the project. Among others, especially information about the main project objectives and the followed technical approach, supported by the list of already published material (i.e. articles) can be found. Publications were submitted to different conferences (e.g., Future Networks and Mobile Summit 2012 or IEEE Wireless Communications and Networking Conference) and journals (e.g. IEEE Journal on Selected Topics in Signal Processing and Signal Processing: Image Communications or IEEE Transactions on Vehicular Technology). This is also reflected in the participation of project members at different conferences, workshops, etc., for which a descriptive table has been included, with data about the scope of the related events.

Noticeably, a third year workshop is foreseen for dissemination purposes. In addition, jointly-organized workshops are planned. A first co-organized workshop will take place around mid-October of 2012 and it appears as a chance to not only disseminate general information about CONCERTO, but also to acquire feedbacks about the use-case refinement and assessment, as well as for creating profitable links with other projects in the eHealth related cluster, which can be exploited for technical support and future project achievements assessment.

Standardisation is a main target of the industrial partners. NTUK is actively involved in 3GPP, in the opportunity for 4G/LTE/LTE-A to become, in terms of performance, range, security, integration and potential replacement of public safety's existing communications systems, the platform of choice to enable a network of proximity devices, and consequently an even larger set of future proximity-aware services.

TCS is participating to Network Centric Operations Industry Consortium (NCOIC®), which is a not-for-profit international corporation committed to integrating existing and emerging open standards into a common, evolving global framework, employing a common set of principles and processes for the rapid global deployment of network-centric applications. More specifically, foreseen contributions are in the SAGM Real-Time Tactical Video Mobile Networking Technical Pattern that is devoted to the transmission of video over Private Mobile Radios for ambulances, fire fighters and police forces.

Finally, SIEMENS is addressing MPEG and its sub-group JCT-VC (jointly with VCEG): Video compression and video streaming. To be highlighted that in addition to technical participation, Siemens heads the German delegation in MPEG. Expected innovations are in video coding for 3D, multi-view and high-quality video streams for medical applications.

When applicable, the industrial partners will also apply for patents in the developed technologies and algorithms.

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1 Introduction

This deliverable summarizes the dissemination and standardization carried out by CONCERTO in the first 6 months of the project lifetime, and more importantly the so far planned related activities. It mainly gives information on the project web page (brief review), partner's web-site relevant references, publications (in books, journals, conference proceedings, workshops, etc.), (joint-)organization of dedicated workshops, participation at conferences, clustering, concertation and standardization meetings, standardization foreseen contributions and project liaisons.

All partners have contributed and plan to pursue dissemination and standardization initiatives. Typically, universities and research centres are more involved in the former, while industrial partners in the latter. However a contribution to almost all the listed activities is supported by several project members in collaboration, though direct individual involvement is reasonable for standardization, where actual inclusion in standardization body is required. Finally, project clustering and concertation meeting are more suitable for the project main contractor.

Noticeably, some project activities (such as the organized or jointly-organized workshops) represent opportunity to carry out both dissemination, collaboration and exploitation.

2 Dissemination activity

A large number of research and technology institutes and organizations may be interested in the achievements of CONCERTO, which will be emphasized by dissemination activities. Moreover, CONCERTO will benefit from the direct participation of the Clinical Engineering and Information Systems from the hospital of Perugia and their visibility in the world of healthcare services: the presence of the end-user in the consortium will be exploited to directly disseminate the project results among the concerned professionals.

CONCERTO project dissemination will be organized through different channels: publications, workshops, demonstrations, web page, actions toward standardization and regulation. These activities are described below.

- A project home page has been opened. General information on CONCERTO scope, progress and partnership is given. Public project documents are published on this home page for dissemination purposes. In addition to such a home page, some partners have included general information about the project and links to the official web site.
- Most partners, especially universities, plan to publish their work in different scientific forums, books, conferences and journals. Publications will be written in the fields of telemedicine, video coding, joint source and channel coding, multimedia content adaptation, IP networking and Quality of Service, wireless transmissions and resource allocation. The scientific publications will be made in top press, journals and conferences of each of these fields to ensure that CONCERTO results will be well disseminated.
 - Articles in recognised journals, mainly IEEE journals, not neglecting other journals in the area of telemedicine and ICT for medical applications, such as the International Journal of Telemedicine and Applications.
 - Members of the consortium are journal editors and special issues on the topics of CONCERTO are envisaged. For instance Dr. Martini (Kingston University) is guest editor of a special issue series on "Healthcare Applications and Services in Converged Networking Environments" in the International Journal of Telemedicine and Applications, which appears a suitable dissemination vehicle for CONCERTO results. A special issue on the topics addressed by CONCERTO will be organised in the IEEE MMTC E-Letter.
 - International conferences, such as IEEE International Conference on Image Processing (ICIP), IEEE International Conference on Multimedia and Expo (ICME), IEEE GLOBECOM, IEEE ICC, IEEE International Conference of Engineering in Medicine and Biology (EMBC), IEEE International Symposium on Biomedical Imaging (ISBI), IEEE Healthcom, ICST Mobihealth, Computers in Cardiology, Future Network & MobileSummit, and many others.
 - Exhibitions, Workshops and Symposiums, such as Packet Video Workshop, Mobimedia, World of Health IT.
 - Workshops organized by the EC like the NEM summit and the ICT Future Network & Mobile Summit.

- Press releases will be considered as well for the dissemination of the final results of the project to the general public.
- The results will also be included in Ph.D. thesis related to CONCERTO's work. All scientific publications will be reported on the homepage.
- The teaching, given by university partners, will be typically based on the latest research results. Consequently, results from this project will be reflected in the courses offered to students. The information will be typically first included in the postgraduate courses and, in the later phases, the key topics will be included in undergraduate courses.

2.1 Project web site

The CONCERTO project website is available at <http://ict-concerto.eu>. This website is designed to serve a two-fold purpose. On the one hand it is the primary tool to disseminate information about the project, its results and actual efforts publicly available to people all around the world. On the other hand it also used for private information exchange between the project partners. In order to support the above goals, a Wiki engine was applied as the basis of the website. The Wiki based system allows users to create, collaboratively edit or even delete pages via a common web browser and also support concurrent editing and enhanced versioning. Reliable user authorization and precise track of changes is also employed in the system level where authorized users able to add, modify, or delete web content via a browser using a simple mark-up language or a rich-text editor. The CONCERTO Wiki uses the specific engine so called TWiki, which is a powerful, flexible, and easy to use wiki based enterprise collaboration and web application platform, typically employed to set up project development spaces, document management systems, or similar groupware tools, either on intranet, extranet or on the Internet. Thanks to the efficient toolset of the TWiki system the CONCERTO project website is easy to operate and maintain, while also able to play its essential role both in dissemination and inside project communication.

2.1.1 Links to CONCERTO in partners' websites

Some partners have included in their own websites a brief description of the CONCERTO project and a link to the official project web site.

For example, being CEFRIEL an international research centre and also strongly involved in EU funded projects for several years, has added to its official web-site (www.cefriel.it) a specific page on its research activities in international partnerships and cooperation. In such a page (<http://www.cefriel.it/index.php/it/ricerca/ricerca-internazionale/1984-concerto-fp7-ict-call-7>) there is a "card" with information and some details about CONCERTO project and the involvement of CEFRIEL in it as a contributing partner. This also works as means of dissemination for the CONCERTO project. Indeed, CEFRIEL is the leader of the dissemination task (T7.2), and is going to exploit all possible channels to spread project achievement and information in general.

2.2 Publications

This paragraph reports full references and abstracts of already published, submitted or planned publications.

2.2.1 Books or book chapter

At the moment there aren't publications like books or book chapters.

2.2.2 Journals and magazines

[1] T. Sutinen, J. Vehkaperä, E. Piri, and M. Uitto. Towards ubiquitous video services through scalable video coding and cross-layer optimization. *EURASIP Journal on Wireless Communications and Networking*, 2012(1):25, 2012.

Abstract: Video content as one of the key features of future Internet services should be made ubiquitously available to users. Moreover, this should be done in a timely fashion and with adequate support for Quality of Service (QoS). Although providing the required coverage for ubiquitous video services, wireless networks, however, pose many challenges especially for QoS-sensitive video streaming due to their inadequate or varying capacity. In this article, we propose a cross-layer video adaptation solution, which may be used for optimizing network resource consumption and user experienced quality of video streaming in wireless networks; thus improving the availability of video services to mobile users. Our solution utilizes the flexibility of the Scalable Video Coding (SVC) technology and combines fast and fair Medium Access Control (MAC) layer packet scheduling with long-term application layer adaptation. The proposed solution both improves the usage of network resources by dropping video data based on its priority when the

network is congested but also reduces efficiently the number of useless packet transfers in a congested network. We evaluate our solution with a simulation study under varying network congestion conditions. We find that already application layer adaptation gains over 60% less base layer losses, momentous for SVC video decodability and quality, than in the case without any adaptation. When our MAC layer scheduling is enabled, nearly a zero loss situation with respect to packet losses carrying base layers can be attained, resulting in peak-signal-to-noise ratio values very close to the original.

Relations with the project work: The article is a result of work done partially in previous ICT-OPTIMIX project and partially in CONCERTO project. The article addresses the efficient usage of network resources through cross-layer optimization.

[2] E. Paolini, G. Liva, B. Matuz, M. Chiani, "Maximum Likelihood Erasure Decoding of LDPC Codes: Pivoting Algorithms and Code Design" *IEEE Trans. Commun.*, accepted for publication.

Abstract—This paper investigates efficient maximum-likelihood (ML) decoding of low-density parity-check (LDPC) codes over erasure channels. A set of algorithms, referred to as pivoting algorithms, is developed. The aim is to limit the average number of pivots (or reference variables) from which all the other erased symbols are recovered iteratively. The suggested algorithms exhibit different trade-offs between complexity of the pivoting phase and average number of pivots. Moreover, a systematic procedure to design LDPC code ensembles for efficient ML decoding is proposed. Numerical results illustrate that the designed LDPC codes achieve a near-optimum performance (very close to the Singleton bound, at least down to a codeword error rate level 10^{-8}) with an affordable decoding complexity. For one of the presented codes and algorithms, a software implementation has been developed which is capable to provide data rates above 1.5Gbps on a commercial computing platform.

Relation with the project work: The article is a result of work done partially in previous ICT-OPTIMIX project and partially in CONCERTO project. This work addresses the efficient implementation of maximum likelihood decoding of packet erasure correcting codes through the concept of pivoting. The described approach allows the implementation of near-optimum packet erasure codes on mobile and portable devices. The design of LDPC codes achieving a good trade-off between erasure correction capability and complexity is also addressed.

[3] M. Mazzotti, S. Moretti, M. Chiani, "Multiuser Resource Allocation with Adaptive Modulation and LDPC Coding for Heterogeneous Traffic in OFDMA Downlink", *IEEE Trans. Commun.*, accepted for publication.

Abstract—We describe an optimization technique for multiuser resource allocation assuming adaptive modulation and coding (AMC) in OFDMA radio downlink communications. The resource allocation process is based on the dual solution of a weighted sum-rate maximization problem. In particular, to realistically address IP-based video and data communications, the set of considered constraints include the number of bits actually present in the different transmission buffers. Furthermore, we propose an innovative AMC solution, based on M-QAM modulation and LDPC codes, jointly working with the scheduler and capable to maximize the throughput while guaranteeing a given set of performance requirements. A simple weight adaptation algorithm is introduced to properly tune the trade-off between opportunistic transmissions and fairness among users. Several simulation results are presented to validate the proposed approach and a comparison with more traditional schemes is provided. In particular, we show that a good trade-off between user fairness and opportunistic exploitation of the radio channel can be reached with the proposed strategies, improving the communication quality for both real-time video and non real-time data applications.

Relation with the project work: The article is a result of work done partially in previous ICT-OPTIMIX project and partially in CONCERTO project. The work addresses the problem of radio resource allocation in LTE-like multiuser scenarios. In particular, the paper addresses the problem of downlink video communications capable to guarantee a set of QoS requirements.

[4] C. T. E. R. Hewage and M. G. Martini, «Edge based reduced-reference quality metric for 3D video compression and transmission» *IEEE Journal of Selected Topics in Signal Processing*, accepted for publication.

3D video applications are delivered over a range of different transmission systems. In order to provide demanding customers with a better service over unreliable communication channels, compression and transmission system parameters can be changed on the fly. For interactive 3D video services, video compression can be adapted (e.g., it can be made more robust and/or rate adaptive) based on the quality measured at the receiver. It has been shown that measuring the (3D) video quality at the receiver-side, and using this information as a feedback to fine tune the system

parameters, will result in improved performance in such systems. However, measuring 3D video quality using Full-Reference (FR) quality metrics is not feasible due to the need of the original 3D video sequence at the receiver side for comparison. Therefore, this paper proposes a Reduced-Reference (RR) quality metric for colour plus depth 3D video compression and transmission, using the extracted edge information of colour plus depth map 3D video. This work is motivated by the fact that the edges/contours of the depth map can represent different depth levels and this can be considered for measuring structural degradations. Since depth map boundaries are also coincident with the corresponding colour image object boundaries, edge information of the colour image and of the depth map is compared to obtain a quality index (structural degradation) for the corresponding colour image sequence. The performance of the method is evaluated for different compression ratios and network conditions. The proposed method achieves good results compared to its counterpart FR quality metric, with a lower overhead for side-information.

Relation with the project work: The article is the result of work done partially in the previous ICT-OPTIMIX project and partially in the CONCERTO project. The work, related to WP3, addresses the key issue of quality assessment for 3D video sequences impaired by both compression and transmission artefacts. Reduced reference metrics are crucial for on-the-fly system adaptation as planned for the CONCERTO project.

[5] M.G. Martini, C.T. Hewage, B. Villarini, "Image Quality Assessment based on Edge Preservation, *Signal Processing: Image Communication*, in press.

Objective image/video quality metrics which accurately represent the subjective quality of processed images are of paramount importance for the design and assessment of an image compression and transmission system. In some scenarios, it is also important to evaluate the quality of the received image with minimal reference to the transmitted one. For instance, for closed-loop optimization of a transmission system, the image quality measure can be evaluated at the receiver and provided as feedback information to the system controller. The original image – prior to compression and transmission – is not usually available at the receiver side, and it is important to rely at the receiver side on an objective quality metric that does not need reference or needs minimal reference to the original image. The observation that the human eye is very sensitive to edge and contour information of an image underpins the proposal of our reduced reference (RR) quality metric, which compares edge information between the distorted and the original image. Results highlight that the metric correlates well with subjective observations, also in comparison with commonly used full-reference metrics and with a state-of-the-art reduced reference metric.

Relation with the project work: The article is the result of work done partially in the previous ICT-OPTIMIX project and partially in the CONCERTO project. The work, related to WP3, addresses the key issue of quality assessment for images impaired by both compression and transmission artefacts. Reduced reference metrics are crucial for on-the-fly system adaptation as planned for the CONCERTO project.

[6] M. G. Martini, B. Villarini, and F. Fiorucci, « A reduced-reference perceptual image and video quality metric based on edge preservation », *Eurasip Journal on Advances in Signal Processing*, vol. 66, 2012. In press.

In image and video compression and transmission, it is important to rely on an objective image/video quality metric which accurately represents the subjective quality of processed images and video sequences. In some scenarios, it is also important to evaluate the quality of the received video sequence with minimal reference to the transmitted one. For instance, for quality improvement of video transmission through closed-loop optimisation, the video quality measure can be evaluated at the receiver and provided as feedback information to the system controller. The original image/video sequence–prior to compression and transmission–is not usually available at the receiver side, and it is important to rely at the receiver side on an objective video quality metric that does not need reference or needs minimal reference to the original video sequence. The observation that the human eye is very sensitive to edge and contour information of an image underpins the proposal of our reduced reference (RR) quality metric, which compares edge information between the distorted and the original image. Results highlight that the metric correlates well with subjective observations, also in comparison with commonly used full-reference metrics and with a state-of-the-art RR metric.

Relation with the project work: The article is the result of work done partially in the previous ICT-OPTIMIX project and partially in the CONCERTO project. The work, related to WP3, addresses the key issue of quality assessment for video sequences impaired by both compression and transmission artefacts. Reduced reference metrics are crucial for on-the-fly system adaptation as planned for the CONCERTO project.

[7] Y. K. Huo, T. Wang, R. G. Maunder and L. Hanzo. Iterative two-dimensional error concealment for low-complexity wireless video uplink transmitters. Submitted to IEEE Transactions on Multimedia.

Abstract: Since joint source-channel decoding is capable of exploiting the residual redundancy in the encoded source signals for improving the attainable error resilience, it has attracted substantial attention. Motivated by the principle of exploiting the source redundancy at the receiver, in this treatise we study the application of iterative Error Concealment (EC) for low-complexity uplink video communications, where the video signal is modelled by a first-order Markov process. Firstly, we derive reduced-complexity formulas for the first-order Markov modelling aided source decoding. Then we propose a bit-based iterative EC algorithm, where a horizontal and a vertical source decoder are employed for exchanging their information using the iterative decoding philosophy. This scheme may be combined with low complexity video codecs, provided that they retain some of the redundancy residing in the video signals and are capable of estimating the soft bit information representing each bit of the video pixels. As application examples, we test our proposed two-dimensional iterative EC in both Wyner-Ziv video coded and uncompressed video transmission scenarios. Finally, we benchmark the attainable system performance against the existing first-order Markov process based soft bit source decoding scheme, where the soft bit decoding is performed by a one-dimensional Markov model aided decoder, as well as by the existing pixel-domain Wyner-Ziv video scheme. Our simulation results show that E_b/N_0 improvements in excess of 6 dB are attainable by the proposed technique in uncompressed video home-networking applications. Furthermore, up to 21.5% bit rate reduction is achieved by employing our proposed iterative error concealment technique in a Wyner-Ziv video coding scheme.

Relations with project work: The work in this article is related to Work-package 3, especially Task 3.1. It addresses a high-quality and reduced-bitrate coding and decoding method for low-complexity wireless video uplink transmitters.

[8] H. A. Ngo and L. Hanzo, Area Spectral Efficiency of Soft-Decision Space-Time-Frequency Shift-Keying-Aided Slow-Frequency-Hopping Multiple Access, IEEE Transactions on Vehicular Technology, vol.61, no.3, pp.1433-1439, March 2012.

Abstract: Slow-frequency-hopping multiple access (SFHMA) can provide inherent frequency diversity and beneficially randomize the effects of co-channel interference. It may also be advantageously combined with our novel space-time-frequency shift keying (STFSK) scheme. The proposed system's area spectral efficiency is investigated in various cellular frequency reuse structures. Furthermore, it is compared to both classic Gaussian minimum shift keying (GMSK)-aided SFHMA and GMSK-assisted time-division/frequency-division multiple access (TD/FDMA). The more sophisticated third-generation wideband code-division multiple access (WCDMA) and the fourth-generation Long Term Evolution (LTE) systems were also included in our comparisons. We demonstrate that the area spectral efficiency of the STFSK-aided SFHMA system is higher than the GMSK-aided SFHMA and TD/FDMA systems, as well as WCDMA, but it is only 60% of the LTE system.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.2.

[9] L. Wang and L. Hanzo, Low-Complexity Near-Optimum Multiple-Symbol Differential Detection of DAPSK Based on Iterative Amplitude/Phase Processing, IEEE Transactions on Vehicular Technology, vol.61, no.2, pp.894-900, Feb. 2012.

Abstract: Differentially encoded and non-coherently detected transceivers exhibit low complexity since they dispense with complex channel estimation. In pursuit of high bandwidth efficiency, differential amplitude/phase (A/P)-shift keying (DAPSK) was devised using constellations of multiple concentric rings. To increase resilience against the typical high-Doppler-induced performance degradation of DAPSK and/or to enhance the maximum achievable error-free transmission rate for DAPSK-modulated systems, multiple-symbol differential detection (MSDD) may be invoked. However, the complexity of the maximum a posteriori (MAP) MSDD exponentially increases with the detection window size and hence may become excessive upon increasing the window size, particularly in the context of an iterative detection-aided channel-coded system. To circumvent this excessive complexity, we conceive a decomposed two-stage iterative A/P detection framework, where the challenge of having a non-constant-modulus constellation is tackled with the aid of a specifically designed information exchange between the independent A/P detection stages, thus allowing the incorporation of reduced-complexity sphere detection (SD). Consequently, a near-MAP-MSDD performance can be achieved at significantly reduced complexity, which may be five orders of magnitude lower than that of the traditional MAP-MSDD in the 16-DAPSK scenario that was considered.

Relations with project work: The work in this article is related to Work-package 5.

[10] C. Dong, L-L. Yang and L. Hanzo. Performance Analysis of Multi-Hop Diversity Aided Multi-Hop Links, IEEE Transactions on Vehicular Technology, no.99, 2012.

Abstract: A multi-hop transmission scheme is proposed and studied, where all the relay nodes (RNs) of a multi-hop link (MHL) are assumed to have buffers for temporarily storing their received packets. Hence, the RNs are operated under the so-called store-and-forward (SF) relaying scheme. As a benefit of storing packets at the RNs, during each time-slot (TS), the best hop typically has the highest signal-to-noise ratio (SNR), which can be selected from the set of those hops that have packets awaiting transmission in the buffer. A packet is then transmitted over the best hop. This hop-selection procedure is reminiscent of selection (SC) diversity, which is referred to here as multi-hop diversity (MHD). In this paper, we investigate both the bit error and outage probability as well as the delay performance of the MHD scheme, when assuming that each hop experiences both propagation path-loss and independent identically distributed flat Rayleigh fading. The MAC layer implementation and several closed-form formulas are derived. Both numerical and simulation results are provided for characterizing the achievable performance of the MHD scheme. Our performance results show that relying on multiple hops has the potential of providing a significant diversity gain, which may be exploited for enhancing the reliability of wireless multi-hop communications.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.3. It addresses a high-reliable relay-aided transmission by exploiting the benefit of multi-hop diversity and the cross-layer cooperation in ad-hoc networks.

[11] S. S. Yang, L. Wang and L. Hanzo, Approximate Bayesian Probabilistic Data Association Aided Iterative Detection for MIMO Systems Using Arbitrary M-ary Modulation. Submitted to IEEE Transactions on Vehicular Technology.

Abstract: In this paper, the issue of designing an iterative detection and decoding (IDD) aided receiver relying on the low-complexity probabilistic data association (PDA) method, is addressed for turbo-coded multiple-input-multiple-output (MIMO) systems using general M -ary modulations. We demonstrate that the classic candidate-search aided bit-based extrinsic log-likelihood ratio (LLR) calculation method is not applicable to the family of PDA-based detectors. Additionally, we reveal that in contrast to the interpretation in the existing literature, the output symbol probabilities of existing PDA algorithms are not the true *a posteriori* probabilities (APPs), but rather the normalized symbol likelihoods. Therefore, the classic relationship, where the extrinsic LLRs are given by subtracting the *a priori* LLRs from the *a posteriori* LLRs does not hold for the existing PDA-based detectors. Motivated by these revelations, we conceive a new approximate Bayesian theorem based logarithmic-domain PDA (AB-Log-PDA) method, and unveil the technique of calculating bit-based extrinsic LLRs for the AB-Log-PDA, which facilitates the employment of the ABLog-PDA in a simplified IDD receiver structure. Additionally, we demonstrate that we may dispense with inner iterations within the AB-Log-PDA in the context of IDD receivers. Our complexity analysis and numerical results recorded for Nakagami- m fading channels demonstrate that the proposed AB-Log-PDA based IDD scheme is capable of achieving a comparable performance to that of the optimal MAP detector based IDD receiver, while imposing a significantly lower computational complexity in the scenarios considered.

Relations with project work: The work in this article is related to Work-package 5.

[12] H. Nguyen, S. X. Ng and L. Hanzo, Irregular convolution and unity-rate coded network-coding for cooperative multi-user communications. Submitted to IEEE Transactions on Wireless Communications.

Abstract: Near-Capacity Multi-user Network-coding (NCMN) based systems using an Irregular Convolutional Code, a Unity-Rate Code and M-ary Phase-Shift Keying are proposed. We consider a multiuser network in which the users cooperatively transmit their independent information to a common base station (BS). Extrinsic Information Transfer (EXIT) charts were used for designing the proposed NCMN scheme for the sake of approaching the Discrete-input Continuous-output Memoryless Channel's (DCMC) capacity. Both the diversity and multiplexing gains are improved, which results in an improved FER-performance. The design principles presented in this contribution can be extended to a vast range of NCMN based systems using arbitrary channel coding schemes.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.3. It addresses a near-capacity NCMN scheme in a multiuser network, where the users cooperatively transmit independent information.

2.2.3 Conference, symposium or workshop proceedings

[13] G. Panza and L. Sioli. "Supporting an architecture for cross-layer optimization". Accepted as poster in Future Networks and Mobile Summit 2012, July 4-6, Berlin.

Abstract. Due to the lack of layer interaction between networked applications and the underlying network during service provisioning, many end user applications and services cannot efficiently utilize the network capabilities, nor can achieve the desired quality of service objectives. As applications grow in areas such as Video on Demand, Video Gaming, or network storage, the management needs to be smarter to pick multi-layer topologies that are efficient across the entire network.

In this paper, the general problem of cross-layer optimization is deeply analysed, and the need for it pointed out together with the most relevant and challenging issues.

In brief, it aims at the overall optimization of application layer and network resources including transmission ones. To achieve such a goal, an effective interaction and exchange of information between the lower and upper layers are required.

Design options for effectively addressing the data collection, synchronization and provisioning, as well as the scalability and backward-compatibility issues are discussed in detail, in order to specify a cross-layer communication architecture that enables full optimization across multiple layers, devices, domains and technologies in the Future Internet.

Relations with project work. The article is the result of activities being carried out in WP2. More specifically, tasks address the cross-layer signalling and communication issues. The article is a primary proposal for an architecture that enables full optimization all over the internet, by supporting cross-communications between multiple layers, devices, domains and technologies, targeting scalability, interoperability, flexibility and efficiency, as required by the application and network scenarios of CONCERTO for a rapid deployment in real-life.

[14] A. Weinlich, P. Amon, A. Hutter, A. Kaup, "Near-lossless Compression of Computed Tomography Images Using Distortion Optimization in Predictive Coding", submitted to Visual Communications and Image Processing (VCIP) 2012, San Diego, CA, USA, Nov. 2012.

Abstract: Predictive coding is applied in many state-of-the-art lossless image compression algorithms like JPEG-LS, CALIC, or least-squares-based methods. We propose a new approach for accurate intensity prediction in pixel-predictive coding of computed tomography (CT) images. Exploiting their particular edge characteristic, the method only relies on a small twelve-pixel context. It does neither require adaptation to larger-region image characteristics nor the transmission of side-information and therefore may be particularly suitable for compression of small images like in region-of interest coding. While applying simple linear prediction with fixed weights in homogeneous regions, a Gauss error model function is fit to given contexts in edge regions and then sampled at the position corresponding to the pixel to be predicted in order to obtain prediction values. By the example of CALIC, it is shown that for CT data the edge modelling prediction (EMP) approach can yield an even smaller prediction error than other methods relying on context modelling.

Relations with the project work: The work in this article is related to Work-package 3, specifically Task 3.1. It addresses the high-quality compression of medical image content (i.e., computed tomography images).

[15] G. Liva, E. Paolini, M. Lentmaier, M. Chiani, "Spatially-Coupled Random Access on Graphs", in Proc. 2012 IEEE Int. Symposium on Information Theory Cambridge, MA, USA, July 2012.

*Abstract—*In this paper we investigate the effect of spatial coupling to the recently-proposed coded slotted Aloha (CSA) random access protocol. Thanks to the bridge between the graphical model describing the iterative interference cancelation process of CSA over the random access frame and the erasure recovery process of low-density parity-check (LDPC) codes over the binary erasure channel (BEC), we propose an access protocol which is inspired by the convolutional LDPC code construction. The proposed protocol exploits the terminations of its graphical model to achieve the spatial coupling effect, attaining performance close to the theoretical limits of CSA. As for the convolutional LDPC code case, large iterative decoding thresholds are obtained by simply increasing the density of the graph. We show that the threshold saturation effect takes place by defining a suitable counterpart of the maximum-a posteriori decoding threshold of spatially-coupled LDPC code ensembles. In the asymptotic setting, the proposed scheme allows sustaining a traffic close to 1 packet/slot.

Relation with the project work: The article is a result of work done partially in previous ICT-OPTIMIX project and partially in CONCERTO project. The work extends the concept of spatial coupling of LDPC code ensembles to high throughput random access protocols based on sparse graphs. It is shown how the use of spatial coupling in random

access contexts can lead to throughputs very close to the theoretical limits. In the scenarios envisaged in the project this access technique is of interest in the deployment of ad-hoc communication networks in emergency areas.

[16] A. Haseeb, M. Martini, S. Cicalò, V. Tralli, "Rate and Distortion Modeling for Real-time MGS Coding and Adaptation", in *Proc. of Wireless Advanced 2012 (WiAd 2012)*, London (United Kingdom), June 2012.

Abstract - Scalable Video Coding (SVC) is the extension of the Advanced Video Coding standard (H.264/AVC) providing video compression with spatial, temporal and quality scalability. Scalability can be exploited in order to provide a better video quality for the end user in video transmission over wireless networks. In this paper we develop a parametric Rate Distortion (R-D) model for Medium Grain Scalability (MGS) SVC depending only on two indexes describing the spatial and temporal complexity of video sequences. The two indexes can be easily obtained from the original raw video, thus enabling real time video adaptation for transmission over channels with variable bandwidth such as wireless channels. The results from simulations show that the use of the proposed model for rate adaptation of multiple-videos sharing a common channel results in an end user video quality comparable to that obtained by using a more accurate non-real time rate distortion model.

Relation with the project work: The possibility to quickly adapt the video stream to the available bandwidth is an important objective of the project, since it allows maximizing the received video quality based on the varying wireless communication conditions. This work is the result of the collaboration between Kingston University and CNIT, and was partially performed during Abdul Haseeb's visit in Kingston University.

[17] H. Appuhami Ralalage, M.G. Martini and C.T. Hewage, "Channel and Content aware 3D Video Scheduling with Prioritized Queuing" in *Wireless Advanced (Formerly SPWC) 2012*, London, UK, Jun 25-27 2012.

This work addresses 3D video delivery over wireless systems, by considering a medium access control (MAC) layer scheduling method combined with a prioritized queuing mechanism to prioritize more important video components/layers with the goal of improving the perceived quality of 3D video at the receiver. We consider colour plus depth 3D video and we exploit its properties in terms of importance of the different components for the perceived quality. The priority values of the scalable video coding (SVC) encoded 3D video are signalled from the Application Layer to the MAC layer via cross-Layer signalling. All the users attached to a Base Station feedback their sub-channel gain to the Base Station periodically via partial channel state information (CSI) and this information is used in the sub-channel allocation process at the scheduler. Thereby, the proposed scheduler always guarantees that more important layers will be scheduled over the sub channels with higher gain at each time slot of an Orthogonal Frequency Division Multiple Access (OFDMA) frame. Simulation results show that the video quality is improved in the prioritized colour/depth layers by several dB in terms of PSNR at the cost of negligible quality degradation in the low prioritized layers. This results in a global quality improvement for the prioritized case.

Relation with the project work: The approach exploits cross layer design for 3D video scheduling to provide a satisfactory video quality for a larger number of users in the system.

[18] J. Zhang, R. Zhang, X. Y. Xu, G. J. Li and L. Hanzo, Effects of practical impairments on cooperative distributed antennas combined with fractional frequency reuse. In *IEEE WCNC2012: 2012 IEEE Wireless Communications and Networking Conference*, Paris, French, 01 - 04 April 2012.

Abstract: Cooperative Multiple Point (CoMP) transmission aided Distributed Antenna Systems (DAS) are proposed for increasing the received Signal-to-Interference-plus-Noise-Ratio (SINR) in the cell-edge area of a cellular system employing Fractional Frequency Reuse (FFR) in the presence of realistic imperfect Channel State Information (CSI) as well as synchronisation errors between the transmitters and the receivers. Our simulation results demonstrate that the CoMP aided DAS scenario is capable of increasing the attainable SINR by up to 3dB in the presence of a wide range of realistic imperfections.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.3. It addresses an optimized delivery method which reduces the interference of DAS system with the aid of CoMP.

[19] L. Li, L. Wang and L. Hanzo, Capacity analysis of the successive AF relaying aided cooperative DS-CDMA uplink. In *2012 IEEE Wireless Communications and Networking Conference (WCNC2012)*, Paris, French, 01 - 04 April 2012.

Abstract: An amplify-and-forward (AF) based successive relaying aided network (SRAN) is designed for a multi-user spread-spectrum scenario conceived for non-coherent (NC) detection in order to convert the typical 50% half-duplex relaying-induced throughput loss to a potential user-load reduction of the CDMA system, where the NC detector allows us to avoid the extra power consumption imposed by channel estimation. With the same “green agenda” in mind, we limit the extra complexity imposed on the relay node (RN) by invoking the AF, rather than the more complex decode-and-forward protocol. We theoretically characterize the proposed AF based SRAN in the context of the DS-CDMA uplink by evaluating its non-coherent Discrete-input Continuous-output Memoryless Channel (DCMC) capacity. We demonstrate that the cooperative DS-CDMA uplink achieves a higher capacity gain with respect to its conventional direct transmission based counterpart, when the system has to support a high number of DS-CDMA users.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.3. It addresses the high-capacity gain in a high number of DS-CDMA users’ system by employing a low-complexity AF based relays.

[20] F. Jin, R. Zhang and L. Hanzo, Frequency-swapping aided femtocells in twin-layer cellular networks relying on fractional frequency reuse. In 2012 IEEE Wireless Communications and Networking Conference (WCNC2012), Paris, French, 01 - 04 April 2012.

Abstract: Femtocells constitute an economical solution conceived for improving the indoor coverage, which are capable of achieving a high network capacity. In order to guarantee a high Area Spectral Efficiency (ASE), femtocells have to reuse the spectrum of macrocells. As a result, the performance of both the femtocells and macrocells may suffer owing to the near-far effects. In this paper, we investigate the Outage Probability (OP) of twin-layer cellular networks, where the Macrocell Base Stations (MBSs) employing Fractional Frequency Reuse (FFR) host the Femtocell Base Stations (FBSs). More explicitly, the frequency-swapping aided femtocell concept is proposed for overcoming the typical near-far problem. We derive the approximate closed-form expressions for the Down-Link (DL) OP for both our benchmarker as well as for our proposed solution. Our analysis demonstrates that the OP of femtocell users in the Cell Centre Region (CCR) and that of the macrocell users in the Cell Edge Region (CER) will be reduced by the proposed swapped-spectrum access policy.

Relations with project work: The work in this article is related to Work-package 5.

[21] S. X. Ng, W. Liu, J-D. Li and L. Hanzo, Near-capacity FEC codes for non-regenerative MIMO-aided relays. In 2012 IEEE Vehicular Technology Conference (VTC2012-Spring), Yokohama, Japan, 06 - 09 May 2012.

Abstract: In this contribution, we derive the Discrete-input Continuous-output Memoryless Channel (DCMC) capacity of the non-regenerative Multiple-Input Multiple-Output (MIMO) relay channel, when the source-to-destination link is inferior and hence considered absent. We design near-capacity Forward Error Correction (FEC) codes for approaching this capacity limit. It is shown that our design is capable of approaching the DCMC capacity within 0.4 dB, when communicating over uncorrelated Raleigh fading channels, where the source node, relay node and destination node are equipped with two antennas each.

Relations with project work: The work in this article is related to Work-package 5, especially Task 5.3. It addresses near-capacity FEC codes in a non-regenerative MIMO relay aided cooperative system.

[22] P. A. Kara, L. Bokor, S. Imre, Distortions in QoE measurements of ubiquitous mobile video services caused by the preconceptions of test subjects, 12th IEEE/IPSJ International Symposium on Applications and the Internet (SAINT2012) EUCASS (Enablers for Ubiquitous Computing and Smart Services) workshop, Izmir, TURKEY, July 16-20, 2012.

Abstract: In telecommunication services, alongside QoS, QoE provision has become essential, thus performance and quality evaluation measurement results need to reflect reality as much as possible. Our goal is to enhance QoE evaluation schemes and enable improved QoE provision for video applications and services anytime and anywhere. In order to eliminate potential erroneous conclusions of QoE assessment techniques, our paper reveals a novel topic of distortions caused by preconceptions based on prior technical knowledge of QoE measurement test subjects. In our analysis we introduce the differences from genuine QoE measurement results in 3G ubiquitous mobile video service scenarios where test subjects were aware of the service parameters during measurements. We show how subjects’ evaluations were affected and investigate the identified phenomenon in terms of Mean Opinion Score deviations and the overall QoE result distortion.

Relations with project work: The work is related to Work Package 3 Task 3.3 (Quality of Experience for image/video (medical) applications), where it is crucial to know the possible distortions in QoE/QoS measurements in order to build metrics that can evaluate more objectively real-time transmission and real-life situations.

2.3 Participation at conferences, symposiums and workshops

The following table lists the dissemination events, i.e. conferences, symposiums and workshops, in which the above mentioned topics will be presented, detailing also the audience type and size.

Dates	Conference, symposium, or workshop	Type of audience	Countries addressed	Size of audience	Partner(s) involved
July 2012	Future Networks and Mobile Summit	Research and Business	World	~1500	CEFRIEL
June 2012	IEEE Wireless Advanced 2012	Research	World	~100	KU, CNIT,UOS
April 2012	2012 IEEE Wireless Communications and Networking Conference (WCNC 2012)	Research and Business	World	~1500	UOS
April 2012	18 th European Wireless Conference (EW2012)	Research and Business	World	~200	UOS
May 2012	2012 IEEE 75 th Vehicular Technology Conference (VTC2012-Spring)	Research and Business	World	~600	UOS
May 2012	5 th IEEE International Symposium on Communications, Control, and Signal Processing (ISCCSP 2012)	Research and Business	World	~200	UOS
June 2012	IEEE International Conference on Communications 2012 (IEEE ICC'12)	Research and Business	World	~2000	UOS
Aug 2012	20 th European Signal Processing Conference (EUSIPCO 2012)	Research and Business	World	~800	UOS
Sep 2012	2012 IEEE 76 th Vehicular Technology Conference (VTC2012-Fall)	Research and Business	World	~1500	UOS
Dec 2012	IEEE 2012 Global Communications Conference	Research and Business	World	~2000	UOS
July 2012	12th IEEE/IPSJ International Symposium on Applications and the Internet (SAINT2012) EUCASS (Enablers for Ubiquitous Computing and Smart Services) workshop	Research and Business	World	~300	BME

3 Standardisation activities

3.1 3GPP

3GPP stand for “3rd Generation Partnership”. It unites 6 key telecom standards bodies of Asia, Europe and USA. 3GPP was created at the end of 1998, with the aim of building from the GSM standards a 3rd Generation of wireless network system. Following the development of wireless technologies as W-CDMA, HSPA and LTE and its associated core network, 3GPP has defined in its Release 10, the main technologies that are recognised by the ITU as “4G” or IMT-Advanced Technologies.

3.1.1 Standardisation strategy

3GPP specification group produces two types of document: Technical report (TR) and technical specification (TS). The technical report contains information that is mainly informative. A technical report can be realised before starting the standardisation process. The standardisation process is built over three stages: the definition of the requirements (Stage 1), the definition of the architecture (Stage 2) and the definition of the protocols (Stage 3).

The strategy started regarding 3GPP standardisation is to be able to introduce outcomes of the project in the standard. It is important to note that the timescale of the 3GPP standardisation is defined by the 3GPP itself, which is not necessarily aligned with the project.

An analysis of the 3GPP work items was performed to identify the work items relevant to the scope of the project, and secondly to identify the possibility of project contribution.

The work items active in the 3GPP were analysed, with a specific focus on the work on-going in the SA1 group, in charge of requirements and services, and in the SA4 group, in charge of the specifications for speech, audio, video, and multimedia codecs.

In the SA1 group, the work item on proximity services (ProSE) and on RAN user plane congestion management (FS-UPCON) was identified to be relevant for CONCERTO.

The work item ProSE relates to the direct communication between mobile devices. The work item was accepted during the meeting SA#53 in September 2011, and contribution was done by the 3GPP members in the next meeting in December 2011, February and May 2012. The work item is structured in 2 parts: one focussing on consumer services, and on focussing on Public Safety services.

In the SA4 group, the 3GPP, the tracking activities performed show that the current activity on http streaming continues to be focussed on the downlink (network to mobile) side. Two work items were identified to be close to the project activities: “Improved Support for Dynamic Adaptive Streaming over HTTP in 3GPP” (FS-IS-DASH), and FS_M3DVC: Study on Mobile 3D Video Coding.

3.1.2 Contribution to standardisation bodies

Regarding the work item Pro-SE, the work performed has been to review the progress of the identified work item, and to ensure that relevant part of CONCERTO scenario requirement were covered by the defined requirements.

NTUK has contributed to this work item to support specific mobile devices usage that are applicable to accident use case considered in Concerto when no infrastructure coverage is available. Future contribution opportunities will be continued.

Regarding the work items identified in SA4 group, it is expected to continue to track their progress in order to identify the future contributions opportunities.

3.1.3 Participation to standardisation meetings

There was no direct participation to standardization meeting performed.

3.2 ISO/IEC MPEG and ITU-T VCEG

3.2.1 Standardisation strategy

The algorithmic work on compression-efficient and high-quality video coding schemes is planned to be used in the context of standardization at the relevant bodies, i.e., ISO/IEC MPEG and ITU-T VCEG. Especially the Joint Collaborative Team on Video Coding (JCT-VC), a joint working group of ISO/IEC JTC1/SC29/WG11 and ITU-T SG16 WP3, is in the focus here. The JCT-VC was established in April 2010, when it had its first meeting in Dresden, where experts from MPEG and VCEG participated. It is currently working on the standardization project on High Efficiency Video Coding (HEVC). HEVC can be seen as the successor of the H.264/AVC standard. The goal for HEVC is the improvement of compression efficiency by 50%.

3.2.2 Contribution to standardisation bodies

Up to now, no contributions to MPEG, VCEG, or JCT-VC have been made yet in the context of the CONCERTO project.

3.2.3 Participation to standardisation meetings

Siemens is actively participating at the standardisation meetings of MPEG, VCEG, and JCT-VC as can be seen from the table below.

Partner	Date (Start/End)	Meeting place	N° of persons	Details
2 Siemens	01/02/12 10/02/12	San Jose, CA, USA	1	JCT-VC, VCEG and MPEG meetings
2 Siemens	30/04/12 07/05/12	Geneva, Switzerland	1	JCT-VC and VCEG meetings

3.3 NCOIC

The Network Centric Operations Industry Consortium (NCOIC®) ([23]) is a not-for-profit international corporation established in August 2004, with the aim of integrating existing and emerging open standards into a common global framework for the global deployment of network-centric applications. Defense companies, educational institutions, government agencies, information technology providers, service providers, etc compose this consortium.

Several teams and working groups have been established, lists on NCOIC web-site:

- **Building Blocks Team:** Identifies a wide variety of elements that help enable interoperability.
- **Integrated Project Teams (IPTs):** these are customer teams whose role is to aggregate the NCOIC technical deliverables in support of specific customer domains.
- **Network Centric Attributes Functional Team:** Develops tools used by systems engineers to determine the level of net centricity that has been achieved in systems.
- **NIF® Architecture Concepts Functional Team:** Develops enabling guidance that systems engineers may use to develop systems-of-systems capabilities.
- **Requirements Validation Functional Team:** Develops and promotes models and practices useful to customers and member companies for validating requirements in a network centric environment.
- **Systems Engineering and Integration Functional Team:** Integrates the efforts and promote the deliverables of NCOIC Functional Teams for the accomplishment of NCOIC goals and objectives. The team recommends and supports the application of systems engineering and education methodologies and develops tools such as an integrated technical roadmap and a lexicon.

NOIC products are: analyses, lexicon of Terms, an Interoperability Framework (NIF), a Network Centric Analysis Tool, Frameworks Recommendations, Systems Engineering Best Practices and Processes, Training and Educational Materials.

3.3.1 Mobile Networks Working Group (MNWG)

The Mobile Networks Working Group (MNWG) is evaluating and recommending mobile networking solutions for network centric systems.

The MNWG has focused on issues with mobile and transportable nodes and networks, their interactions with fixed network infrastructure, and scenarios with mobile infrastructure. Impacts of wireless links including satellite links are considered. A wide range of use cases exist, including humanitarian disasters ranging from 9/11 to routine first aid level emergency events.

3.3.1.1 SAGM Real-Time Tactical Video Mobile Networking Technical Pattern

The SAGM Real-Time Tactical Video Mobile Networking Technical Pattern is devoted to the transmission of video over Private Mobile Radios for ambulances, fire fighters and police forces.

3.3.2 Contribution to standardisation bodies and participation to standardisation meetings

Contribution to the SAGM Real-Time Tactical Video Mobile Networking Technical Pattern is TCS goal. Indeed, activities on video adaptation realised in WP4 could be effectively applied to video transmission over Private Mobile Radios, which is one of the main TCS exploitation plan.

TCS is already involved in this pattern development. A second edition, including more interoperability details, as well as new formats in particular for metadata handling, is foreseen and TCS plans to actively contribute. However, these activities have been recently suspended due to scarcity of clients funding the work, so no contribution can be done at the moment. TCS expects activities to restart before the end of CONCERTO.

4 Workshops

4.1 Objectives and strategies

To get broader knowledge of the project results and challenges addressed by CONCERTO, the project will organise a dedicated open workshop in the third year of the project. The purpose of this workshop is that the general public can get information on the CONCERTO overall challenges as well as detailed results about some of the fields mentioned above. Moreover this workshop will illustrate and promote the CONCERTO concept through the demonstration of real implementations. Personnel using healthcare equipment (e.g., doctors) will be invited to this workshop, in order to further validate the achievements of the project.

CONCERTO partners will also co-organize two joint-workshops with projects dealing with similar topics: At least one workshop will be more targeted to refine and validate the scenario and discuss possible issues; other workshops will be more focused on presenting technical solutions addressing also the envisaged scenarios and will be organised with other projects of the cluster.

4.2 Event and participants

4.2.1 Joint workshop with projects on eHealth

The goal of the first year workshop is to obtain a further validation and possible refinement of CONCERTO use cases and requirements, in order to assure the relevance of the CONCERTO work for healthcare professionals. The organization of this workshop already started.

Thanks to the support and the effective involvement of CONCERTO's Project Officer (PO), Mr. Loukianos Gatzoulis, PO of projects involved in ICT for eHealth, has been contacted: CONCERTO's flyer has been sent in January 2012 to our PO and, through him, to Mr. Gatzoulis.

Mr. Gatzoulis answered in February 2012 by proposing one of the two following concertation meetings in autumn on specific application areas:

- Management of mental disorders (e.g. depression, bipolar disorder, stress). Target time for this: end of September
- ICT solutions for rehabilitation (e.g. stroke rehabilitation). Target time: around mid-October.

CONCERTO fits better the 2nd proposed concertation meeting since there is the common element of remote care or in-hospital care for the rehabilitation of the patients using ICT solutions, which is also one of the use cases considered in CONCERTO.

The idea is to present the use cases identified in WP2 and collect some feedbacks before the finalisation of D2.1. A slot of a couple of hours will be devoted to the presentation and the discussion of the main scenarios considered by the project.

CONCERTO asked also to have the list of projects that should be present at this concertation meeting. Indeed, the knowledge of the involved projects (and their consortia) would help in better targeting our presentation.

4.2.2 Other possible joint workshops

Other workshops will be organised to discuss technical solutions with other projects (for more details see Sec. 5.1).

4.2.3 Final workshop

A workshop will be organised at the end of the project to disseminate the achievements and the results to the relevant scientific communities. We plan to organise the workshop co-located with a large international conference, in order to disseminate the results to a wider public.

4.3 Expected results and exploitation

4.3.1 First joint-workshop

After a brief presentation of CONCERTO general framework, the use cases addressed in WP2 will be described in more detail, putting focus on the subset better fitting participant's skill and interests.

As already mentioned, the aim is to collect any feedback about the overall relevance in the eHealth community of the selected use cases, their correct specification in considered scenarios and related requirements. Live discussions with possible wrap up, and post-workshop contacts should lead to the refinement of D2.1 and therefore, its final validation. Both high-level and specific comments will be collected by properly managing the discussion, therefore keeping the focus on the matter, going into details only when needed. For the former comments, only CONCERTO use-cases will be investigated and for the latter, also technical requirements can be issued if relevant for the application and network research topics considered in CONCERTO. The chairman of the workshop will keep the focus, possibly stimulating comments, suggestions and discussions. The workshops give also the chance to establish new relationships to maintain during the project life-cycle for technical mutual support, as well as for dissemination and exploitation purposes. After having developed even partially the solutions foreseen in CONCERTO, some of the workshop's participants could be contacted for opinions, possibly testing activity, or just project dissemination. Indeed, some people could also participate to the other workshops regarded by CONCERTO, with evident advantages in terms of already acquired background. This fosters both collaboration and complementarity between projects related to eHealth with overall synergy. Finally, if companies and device makers in the issued technology and medical environments are present at the workshop, an improved exploitation of achievements with higher and faster hitting of the market is foreseen.

5 Project liaisons

5.1 Bilateral project liaison

5.1.1 SemanticHealthNet

SemanticHealthNet is a Network of Excellence aiming at developing a scalable and sustainable pan-European organisational and governance process for the semantic interoperability of clinical and biomedical knowledge, to help ensure that EHR systems are optimised for patient care, public health and clinical research across healthcare systems and institutions.

CONCERTO already tried to contact this NoE and intends to identify potential benefits in establishing a communication with SemanticHealthNet.

5.1.2 ENVISION

ENVISION proposes a three-pronged, cross-layer solution for multi-sourced, highly interactive distributed meshes of HD and 3D multi-sensory channels future networked media applications. The applications demand unprecedented quantities of network resources in unpredictable locations and the traditional solution of pre-provision sufficient network resources everywhere is no longer economically viable given the huge capacities required. ENVISION will design a three-pronged, cross-layer solution for: i) optimising intelligent overlay applications for true end-to-end performance at a global scale according to the actual capabilities of multiple underlying ISPs; ii) mobilizing network resources are dynamically to where they are most needed; and iii) adapting on-the-fly the content to what the network is able to deliver.

ENVISION activities are thus related to CONCERTO work, even if targeting different applications. It would be interesting for CONCERTO to discuss the solution developed by ENVISION for cross-layer signalling and eventually exploit it. For this reason, a workshop with ENVISION has been organised and will be held during the CONCERTO meeting in June in Kingston University. D. Griffin, coordinator of ENVISION, will present cross-layer signalling messages designed in ENVISION.

5.1.3 OPTIBAND

The aim of OptiBand project is to overcome the bandwidth bottleneck that is created by the DSL access network. This bottleneck does not currently allow for adequate provision of personalised High Definition video content to the subscriber. The project have researched and developed an algorithm for data dropping that is based on the nature of the video content.

IPTV is a relatively new method of delivering and viewing television programming using an IP network and high speed broadband access technology. IPTV is poised to create an entirely new mindset about the television experience. IPTV enables television programming to be available whenever each individual consumer demands it. In this way, each viewer can create their own custom content and viewing schedule. IPTV enables personalized applications such as Video On Demand (VOD), Network Personalized Video Recorder (NPVR), Shifted-TV and more. IPTV is promoted mainly by Telecom Network Operators and Content Providers, as their way of competing with CATV and Satellite network providers. IPTV provides telecommunication operators the opportunity to better serve the video market and better compete with the industry transition to HD (High Definition) and unicast video (e.g. Video on Demand), both creating challenges to the existing CATV (Cable TV) and SAT (Satellite) providers. One of the main challenges in IPTV is the line rate of the access lines, which is predominantly ADSL.

OptiBand has focused on optimizing the bandwidth of IPTV and Internet TV for the delivery of multiple HD streams over a single ADSL line, and by that enabling multiple HD channels per household.

The core of the OptiBand project is related to CONCERTO project which is the dynamic adaptation of video streaming based on available bandwidth. VTT is participating OptiBand project and the results related especially to Internet TV streaming can be utilised also in CONCERTO project.

5.2 Concertation Meetings and cluster-related activities

The project actively participates in the activities organised at programme level relating to the Networked Media Systems area with the objective of providing input towards common activities and receiving feedback (e.g. from clusters and coordination groups), offering advice and guidance and receiving information relating to ICT programme implementation, standards, policy and regulatory activities, national or international initiatives, etc.

CONCERTO is actively involved in activities of the Future Media Networks cluster and, after the presentation of the project at the plenary meeting in December 2011, it has been invited to participate to the 3D Immersive Interactive Media.

Partner		Date (Start/End)	Meeting place	N° of persons	Details
1	THALES	13/12/11 14/12/11	Brussels, Belgium	2	Presentation at the plenary meeting and at the Future Media Networks cluster

5.3 Dissemination in european and international fora and organised events

The concepts of the CONCERTO project will be disseminated in the framework of a number of international events and fora (including for instance *Future Internet for e-Health* in June 2012).

6 Conclusions

The work in the OPTIMIX project on dissemination and standardization is being carried out according to planning. Twenty two publications have been already made, mainly by each partner individually, but this is because the project has just started. Indeed, joint collaboration in dissemination is a primary objective. As a consequence, the project shows and foresees an active participation at conferences, workshops, etc. as well as at concertation meetings and other ICT project meetings.

A third year workshop is going to be organized by CONCERTO for dissemination purposes. However, other workshops can be jointly-organized in collaboration with other projects, for example in the eHealth related cluster, with the multi-objective of collecting feedbacks about the currently developed work (and its validation/assessment), mutual technical support, improved market options and again dissemination. As described in the related subsection, the first year issued workshop about ICT solutions for rehabilitation (e.g. stroke rehabilitation) will take place in October and represents an opportunity for both improving the project work and establishing links for profitable collaborations.

The industry partners NTUK, TCS and Siemens are actively involved in standardization consortiums and bodies. More specifically, NTUK is involved in 3GPP, TCS in NCOIC and SIEMENS in MPEG, VCEG, and JCT-VC. Other groups could be addressed in the future (e.g. IETF) depending on relevance and suitability of project achievements. The generation of Intellectual Property Rights (IPRs) is also a possible final result of such activities.

Deliverables D7.4 and D7.6 due by M16 and M36 respectively, will complement this listing of dissemination and standardisation items by activities planned and performed in a second part of the project, and carried out in the final part of CONCERTO.

7 References and Glossary

7.1 References

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7.2 Glossary

<i>AMC</i>	<i>Adaptive Modulation and Coding</i>	<i>Adaptive strategy to select modulation and coding parameters based on channel state and cross-layer information.</i>
<i>BEC</i>	<i>Binary Erasure Channel</i>	<i>Communication channel model</i>
<i>CSA</i>	<i>Coded Slotted Aloha</i>	<i>Multiple access technique.</i>
<i>JSCC</i>	<i>Joint Source and Channel Coding</i>	
<i>LDPC</i>	<i>Low Density Parity Check</i>	<i>Coding solutions</i>
<i>MGS</i>	<i>Medium Grain Scalability</i>	<i>Scalability feature implying medium differences between quality levels.</i>
<i>ML</i>	<i>Maximum Likelihood</i>	<i>Decision strategy based on the maximization of the likelihood function.</i>
<i>NGN</i>	<i>Next-Generation Networks</i>	<i>ITU-T has released some Recommendations about its specification</i>
<i>OFDMA</i>	<i>Orthogonal Frequency Division Multiple Access</i>	<i>Multiple access technique.</i>
<i>QoS</i>	<i>Quality of Service</i>	<i>It is mostly related to the quality of the service as perceived by the user, without considering aside information (such as, user-profile, user-context, application specificity, etc.)</i>
<i>QAM</i>	<i>Quadrature Amplitude Modulation</i>	<i>Modulation technique.</i>
<i>SVC</i>	<i>Scalable Video Coding</i>	<i>Video coding technique.</i>
<i>WLAN</i>	<i>Wireless local area network</i>	<i>WiFi is a commercial name for a WLAN realization.</i>