



Deliverable D7.3

Second Dissemination Report, including updated version of Dissemination Plan

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Abstract

Deliverable D7.3 is the second dissemination report of the OCEAN project. D7.3 updates the First Dissemination Report of D7.2.

Deliverable D7.3 presents the project dissemination strategy, including the dissemination target audience groups, the actions and channels to reach these groups during the project life, and the first opportunities for external collaborations. Then it provides a preliminary identification of the expected results exploitable by the consortium partners, and finally the project's initial approach concerning the possible use of and contributions to standards.

All the dissemination activities of the OCEAN project are reported on a regular basis. A preliminary version of the dissemination plan was presented in deliverable D7.1 at month M7. The first dissemination report with an updated version of the Dissemination Plan was presented in deliverable D7.2 at month M11. The final dissemination plan will be presented in D7.4 (Final Dissemination Report, including updated version of Dissemination Plan) at Month M35.

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EXECUTIVE SUMMARY

Deliverable D7.3 is the second dissemination report of the OCEAN project. It provides an update to the first dissemination plan in D7.2 plan for OCEAN dissemination, exploitation, and standardisation activities to be achieved during the project life.

Deliverable D7.3 gives the background and the objectives of the project, the scope of the Work Package WP7 and the scope of Deliverable D7.3. OCEAN aims to design and develop a second-generation open content delivery system (CDN) which is significantly more efficient than traditional CDNs deployed so far over Internet. The OCEAN system performs content caching in the broadband cabinets and exchanges, thus bringing the media files much closer to the end user than traditional CDNs. OCEAN deploys network-controlled, content-aware, highly scalable and adaptive content delivery techniques. The OCEAN technology aims to bring down internet content delivery costs and foster multi-vendor equipment solutions, therefore enhancing competition. WP7 is the “Dissemination” work package of OCEAN. Its objectives are to ensure the dissemination of the project's results and to coordinate its visibility at an international level through web presence, publications, participation to or arrangement of specific events, contributions to standards and other industrial forums.

Then Deliverable D7.3 details in three steps the updated version of the project dissemination strategy.

First it identifies the key target audience groups OCEAN dissemination actions will focus on:

- The stakeholders of the audiovisual content delivery market over Internet, especially the telecom operators (telcos), the content providers, the content aggregators/publishers, the content distribution service providers, the equipment and technology vendors. The definitive success of the OCEAN project would be the widespread adoption of its recommendations and innovations by these players;
- The research communities, which are targeted with OCEAN’s innovations and research results, such as algorithms for caching and content distribution, novel architectures, interfaces and protocols, as well as with results of techno-economic and market studies;
- The standardization bodies, which are expected to ultimately “consolidate” the OCEAN framework and architectures by capturing them in suitable standards that allow on one hand the equipment and technology vendors to implement the required functions in a cost-efficient way, and on the other hand the content delivery service providers to deploy the OCEAN functions quickly, economically and without interworking problems.

Second it describes the planned activities and channels to reach these target groups:

- The OCEAN Website represents the main channel for dissemination, providing different levels of information adapted to the different target audience groups;
- The project flyers and brochures are made available in printed form at conferences and events. They can also be retrieved on OCEAN website;
- The project public deliverables are made available on OCEAN website, providing full details on most of OCEAN’s studies and outcomes;
- The specialized magazines and journals in which OCEAN project intends to publish most of its scientific results;

- The conference and events OCEAN plans to attend with presentations and posters. Presentations allow to reach a large audience, whereas posters can be used as a support for more individualized and in-depth exchanges;
- The project's open events; OCEAN will arrange open events (workshops) to collect requirements and inputs from market stakeholders, and to communicate on the project findings; they will therefore also help for dissemination.

Third Deliverable D7.3 presents further opportunities for collaboration with external research activities and groups. The OCEAN project and consortium partners have committed to contribute to the objectives of the Future Media Networks (FMN) cluster, the Future Internet Assembly (FIA) and to the Networked and Electronic Media (NEM) Technology platform initiatives. Some opportunities for external collaboration with other research projects such as ENVISION and COAST are also identified.

Next, Deliverable D7.3 details the expected exploitable results of OCEAN to date. As the project progresses further, the list may change to include more details.

Result	Type	Deliverable(s)¹
Elaboration of business strategies providing investment incentives to the different types of players in the value chain	Specification / Design	D2.3, D2.4, D2.5
Design of a new open content delivery architectural framework	Design	D3.1, D3.2
Specification of innovative content popularity distribution estimation techniques and self-learning caching algorithms	Specification	D4.1, D4.2, D4.3, D4.4, D4.5, D4.6, D4.7
Specification of new media-aware congestion control mechanisms and distributed delivery methods	Specification	D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D5.7, D5.8, D5.9
Simulations, large-scale emulations and trial in a real ISP network to assess the validity and performance of these algorithms and mechanisms	Implementation / Proof of Concept	D6.4, D6.5, D6.9, D6.10, D6.11, D6.12

Table 1. Expected exploitable results of OCEAN project

For industrial partners, OCEAN research will affect the next generation of content delivery services, the corresponding architectures, technologies and the underlying business models over Internet. It is in these areas that exploitation offers key strategic opportunities for the longer-term development of their respective businesses. For academic partners, exploitation of OCEAN will be manifested in an increase in research and know-how in the areas of Content Delivery Architectures, Caching algorithms and Advanced audiovisual coding schemes.

¹ Table 3 describes these Deliverable numbers.



Finally Deliverable D7.3 presents OCEAN plans as regards standardisation. OCEAN has two objectives here: exploit the latest developments from the standardisation bodies that are relevant for OCEAN project, and contribute actively to standards to promote OCEAN's technical outcomes.

For the first objective, a standardisation surveillance group has been set up inside the OCEAN consortium aiming at monitoring the most relevant bodies, including ETSI TISPAN, ETSI MCD, ETSI MCD CDN-I, MPEG MMT, IETF AVT, IETF MMUSIC, IETF CDNI working groups, as well as ATIS, Broadband Forum, DVB and 3GPP.

The second objective is decisive for the success of the project. Indeed OCEAN will define an OPEN architectural framework for audiovisual content delivery over Internet. "OPEN" means that OCEAN will specify public interfaces between the major building blocks in multimedia content delivery architectures, outlining key responsibilities and roles. As the project aims to provide solutions that are applicable for multi-player environments, standardisation is an important issue to ensure that the proposed solutions can be actually deployed by different players using equipments from different vendors. OCEAN partners have been deeply involved in the CDNI initiative at IETF this year, which successfully led to the creation of a Working Group dedicated to CDN Interconnection standards (IETF CDNI WG). OCEAN partners have also been contributing actively on the same topics at ETSI.

All the dissemination activities of the OCEAN project are reported on a regular basis. A preliminary version of the dissemination plan was presented in deliverable D7.1 at Month M7. The first dissemination plan was presented in D7.2 (First Dissemination Report, including updated version of Dissemination Plan) at month M11. The final dissemination plan will be presented in D7.4 (Final Dissemination Report, including updated version of Dissemination Plan) at Month M35.

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1. INTRODUCTION

1.1 OCEAN background and objectives

1.1.1 Context and focus of research

Content delivery networks (CDNs) become more and more important for audiovisual content delivery over the internet. CDNs today have a number of shortcomings that will become more prominent in the near future when the volume of multimedia content to be delivered will be one or two orders of magnitude higher. Firstly, CDNs solve the so-called “CDN middle mile” problems, but completely rely on best effort delivery for the “CDN last mile”. Secondly, CDNs do not take into account primary network information for delivering content to the end-user. Thirdly, CDNs today are closed systems consisting of a worldwide distribution of servers that rely mainly on a set of proprietary mechanisms and interfaces. Finally, the CDN business model today is limited to offering content producers the prospect of lower latency access for the end-user. For real quality multimedia delivery over the aggregation and access network, CDNs will have to interact with network level mechanisms from the network provider.

1.1.2 Objectives and expected results

The OCEAN project will investigate scalable content and network aware mechanisms to deliver multimedia objects with high quality over the “CDN last mile” for fixed broadband access networks. OCEAN will investigate the opportunity to bring copies of popular content closer to the user by deployment of caches deeper into the aggregation networks. Such a deployment can help to alleviate typical congestion caused by flash crowds. Furthermore, a network-controlled adaptive content delivery will be investigated taking into account pre-congestion control, highly distributed and scalable media delivery, and network coding. To allow interconnection between CDNs, OCEAN will specify open interfaces. All investigations will be accompanied by adequate business models, cost models and go-to market strategies.

1.2 WP7 Scope

The objectives of WP7 “Dissemination” are to ensure the dissemination of the project's results and to coordinate its visibility at an international level through publications, contributions to standards and other industrial forums, participation or arrangement of specific events.

WP7 will manage the exploitation plan, coordinate and arrange all activities related to the dissemination of the OCEAN project results within the research community, standardization bodies and towards markets players.

1.3 Scope of Deliverable D7.3

This deliverable is second dissemination report of the OCEAN project. It presents an updated version of the project's dissemination plan introduced in deliverable D7.1 and D7.2. OCEAN dissemination targets to spread the outcome of the project in various ways, including different publication channels



such as scientific journals and conferences, standardization activities and external collaboration. An overview on the strategic plans for the dissemination of the project results is given in Section 2. Details on the exploitation plan can be found in Section 3. Planned activities in standardization are listed in Section 4. Finally Section 5 concludes this deliverable.

2. DISSEMINATION STRATEGY

2.1 Main objectives and overall strategy

OCEAN aims to design a new, open content delivery framework that optimizes the overall QoE experience by the end-users. The main elements to realize this are: optimized and dynamic caching closer to the users, self-learning caching algorithms, open interfaces between different CDN network elements, media-aware congestion control.

A crucial objective of this open content delivery framework is that it allows to develop viable business models for all the parties involved. This can only be achieved if the framework and the concepts defined and worked out in the OCEAN project are widely known, accepted and applied, not only by the OCEAN Partners but by the whole industry.

Reaching such a wide level of acceptance takes time, and requires a suitable dissemination strategy that makes the industry in an early stage aware about the OCEAN objectives and plans, and in later stages about the progress and the results, and the possible consequences these results may have for the content delivery value network.

A further condition for wide acceptance is that OCEAN takes into account the evolutions happening in parallel in the market as a whole, and that it adjusts its objectives and plans when needed. In this context, external collaboration with other projects and initiatives is a valuable instrument.

In order to meet these goals and requirements, the OCEAN dissemination strategy is based on the following elements:

- Dissemination starts at an early stage, and is a more or less continuous activity whereby results, achievements and further plans are gradually communicated to the market;
- Since many stakeholders and target groups are involved and since they are quite diverse in nature, dissemination will be done via multiple channels. Section 2.2 elaborates on the different target groups, whereas section 2.3 identifies the channels via which the dissemination will be done;
- Section 4 presents first presents first opportunities for collaboration with external research activities and groups.

2.2 Dissemination target groups

Different target audience groups will be impacted by or involved in the OCEAN activities: the stakeholders of the audiovisual content delivery market over Internet (namely the telecom operators, the content providers, the content aggregators/publishers, the content distribution service providers, the equipment and technology vendors), the research communities and the standardization bodies. The dissemination actions of the OCEAN project have to address all these target groups.

2.2.1 Telecom Operators

Telecom Operators (telcos) need to be addressed with innovative technical concepts that improve their network architecture, with standardized solutions that ease interworking and increase cost

efficiency, and with business models related to an OCEAN based architecture that are profitable for themselves and beneficial for the whole value network.

Dissemination channels include standardization, public project deliverables, and publications concerning innovations in content network technology.

2.2.2 Content Providers

Dissemination to Content Providers should focus on creating awareness about the opportunities that an enhanced content delivery infrastructure can bring for large scale, high quality distribution of content to end users, but also about the consequences that this raises in terms of required investments. It is expected that such higher awareness creates good opportunity to encourage Content Providers to engage in more collaborative business models with telcos and content distribution providers.

Open OCEAN events are suitable channels for this kind of dissemination.

2.2.3 Content Aggregators/Publishers

Content Aggregators and Publishers need to be made aware of the added value that the OCEAN architecture can bring to improve the end user Quality of Experience and to increase the incentives for operators and service providers to invest in network upgrading, and of the opportunities that this can bring for increasing their own revenues.

Open OCEAN events and publications on business model innovations are appropriate dissemination channels.

2.2.4 Content Distribution Providers (a.k.a. Traditional CDNs)

Content Distribution Providers must be informed about developments in the domain of CDN interworking and the related standardization towards open interfaces. At the same time they must be convinced of the opportunities that open interfaces can bring, and about the complementarities that CDNs deployed deeper into telco networks can add to the existing closed architectures.

Appropriate channels for this kind of dissemination are publications about developments in network architecture and ongoing standardization work.

2.2.5 Equipment and Technology Vendors

Equipment and technology vendors are to be informed of new research tracks and technical innovations that allow a smooth and cost-efficient integration of OCEAN based CDN functions in network elements over telco networks. The vendors should also develop a better awareness about the drivers for telcos and content delivery service providers to evolve in the content delivery networking domain, in order to optimize their product roadmaps and R&D activities.

Focus in dissemination actions towards equipment vendors is on public project deliverables, publications on technical innovations and on contributions to standardization.

2.2.6 Research Communities

The Research Communities are targeted with innovations and research results, such as algorithms for caching and content distribution, novel architectures, interfaces and protocols, and also with results of techno-economic and market evaluations.

Typical means for this kind of dissemination are: publications in technical journals, contributions to conferences, the public deliverables produced by the project, and also external collaborations with other projects and initiatives.

The Future Media Networks (FMN) cluster and the Networked and Electronic Media (NEM) Technology Platform initiative will be among the research communities interested in the project results to support their research activities.

2.2.7 Standardization Bodies

Standardization bodies are expected to ultimately “consolidate” the OCEAN framework and architectures by capturing them in suitable standards that allow on one hand the equipment and technology vendors to implement the required functions in a cost-efficient way, and on the other hand the content delivery service providers to deploy the OCEAN functions quickly, economically and without interworking problems.

Typical dissemination inputs for standardization are contributions to working groups of the bodies, preferably joint contributions from different OCEAN Partners.

2.3 Activities and channels

Different activities will be started and different channels exploited to communicate on OCEAN project’s objectives and to disseminate its outcomes. These activities and channels are summed up in Table 2. More information is provided in the following subsections.

Activity / Channel	Remarks
OCEAN Website	The website is a key channel for dissemination. Its URL can be simply added as a signature on any support: project document, mail, brochures, professional card, etc. Internet users can get a general overview of the project in 2 clicks while interested people can retrieve all its public deliverables easily.
Flyers and Brochures	Flyers and brochures are made available in printed form at conferences and events. They can also be retrieved on OCEAN website.
Project Public Deliverables	The project public deliverables are made available on OCEAN website, providing full details on most of OCEAN’s studies and outcomes.
Publications in magazines and journals	The OCEAN project intends to publish most of its scientific results in specialized magazines and journals. An initial list of candidate

	journals and magazines has been identified in this section.
Participation to conferences and events: presentations and posters	<p>National and international conferences organised by institutions, universities and research organisations are important opportunities to share project results with other experts in the field.</p> <p>Such participation consists in delivering presentations and/or in having a stand with posters. Presentations allow to reach a large audience whereas posters can be used as a support for more individualized and in-depth exchanges.</p>
Open events	OCEAN will arrange open events (workshops) to collect requirements and inputs from market stakeholders, and to communicate on the project findings, they will therefore also help for dissemination.

Table 2. Summary of planned dissemination channels

2.3.1 OCEAN Web presence

The website is the first step in helping dissemination. The project coordinator registered the domain name “*ict-ocean.eu*” and created a first version of the project website before the official project start (February 1st, 2010).

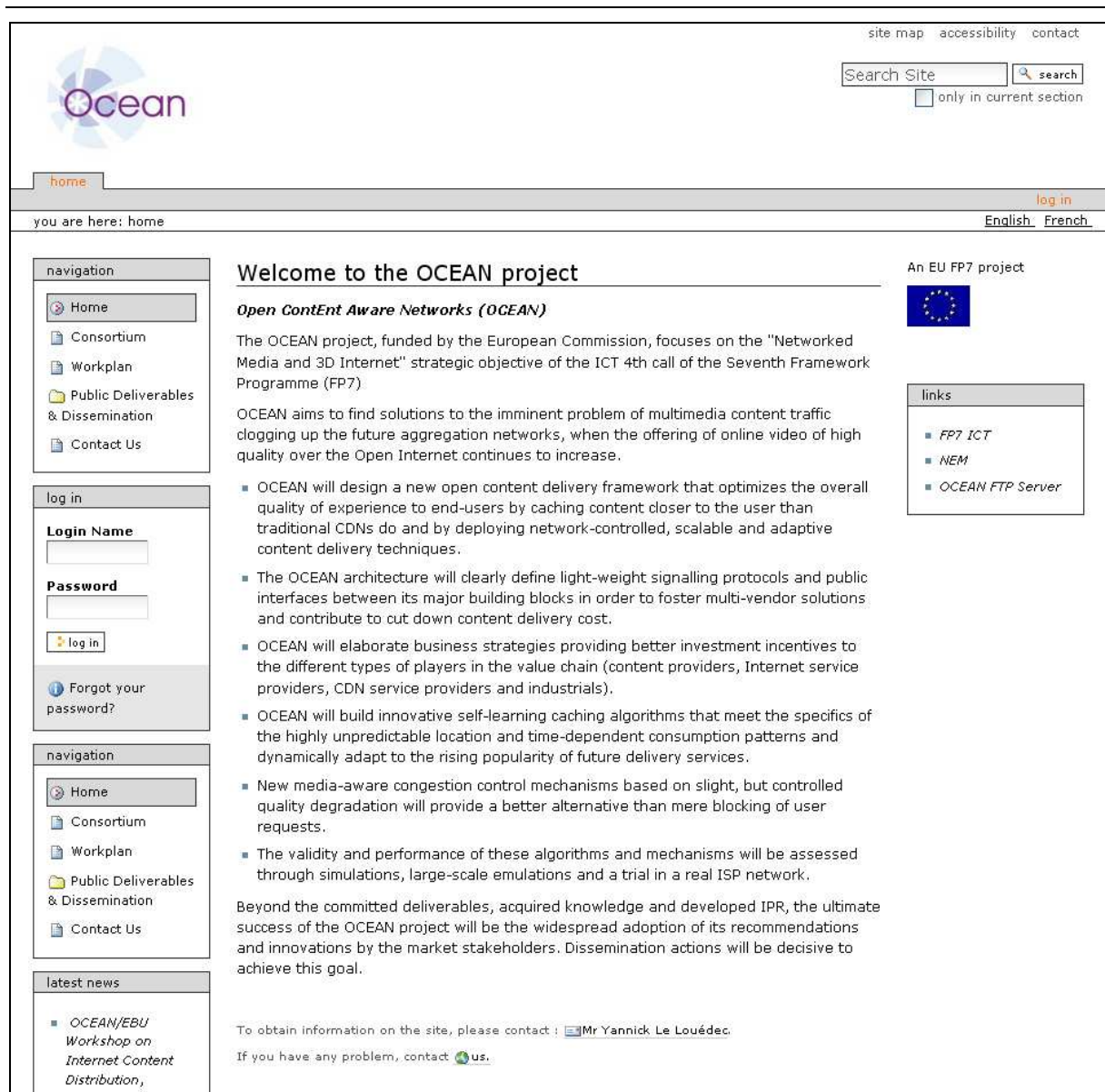


Figure 1: OCEAN Web presence

The public part is available to any web user to fulfil the following three roles:

1. It delivers the general information about the project, including list of participants, objectives, status reports, acknowledge EC contribution and links to other related and relevant sites;
2. It is a complete repository of all information delivered by the project (public deliverables, scientific publications, etc.);
3. It acts as a unified point of contact for the project and will aggregate interest in OCEAN.

The website also includes a private area, which contains electronic versions of released private deliverables and quarterly reports in order to facilitate the communication inside the project and the follow-up of the project by the Commission services.

The public website is maintained regularly as the project produces results, as papers are published, deliverables released or whenever there is news to report. This included the creation this year of a “Frequently Asked Questions” page (<http://www.ict-ocean.eu/faq>) and the repository page for OCEAN review 1 (<http://www.ict-ocean.eu/private-area/repository-for-ocean-1st-review>).

2.3.2 Flyers and brochures

The OCEAN will produce and contribute to flyers and brochures for the purpose of communicating on its objectives and outcomes. Flyers and brochures will be made available in printed form at conferences and events, as well as on OCEAN website. An overview of the project has also been already provided for the European Commission brochure on Networked Media Systems [NETMED2].

2.3.3 Public Project Deliverables

The following table lists the public deliverables of the OCEAN project.

<i>Deliverable</i>	<i>Deliverable name</i>	<i>Nature (R - Report; O - Other)</i>	<i>Delivery date</i>
D1.1	OCEAN Project WebSite (public area and restrictive area)	O	M3
D2.1	Current state of the OCEAN market (service, usage, regulation)	R	M9
D2.2	Final requirements for Open Content Aware Networks.	R	M12
D3.1	OCEAN functional architecture and open interface specification	R	M23
D4.2	Highly Dynamic and Distributed Caching – Report	R	M12
D5.2	Evaluation of congestion control via the scalable video codec	R	M18
D5.5	Distributed delivery methods using Content-aware Network Codes	R	M12
D6.1	Definition of evaluation scenarios – phase I	R	M12
D6.6	Definition of evaluation scenarios – phase II	R	M24

D7.1	Preliminary version of Dissemination plan	R	M7
D7.2	First Dissemination Report, including updated version of Dissemination Plan	R	M11
D7.3	Second Dissemination Report, including updated version of Dissemination Plan	R	M23
D7.4	Final Dissemination Report, including updated version of Dissemination Plan	R	M35

Table 3. Public Project Deliverables

2.3.4 Publications in Journals and Magazines

Table 4 identifies candidate Journals and Magazines that are relevant to the scope of the Ocean project, along with the publisher's name and country, and the Impact Factor.

The Impact Factor refers to the measure reflecting the average number of citations to articles published in science and social science journals indexed in Thomson Reuter's Journal Citation Reports.

<i>ISI Category</i>	<i>Journal</i>	<i>Publisher</i>	<i>Country</i>	<i>Impact Factor</i>
Computer Science, Artificial Intelligence	IEEE Transactions on Neural Networks	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	3.726
	Artificial Intelligence	ELSEVIER SCIENCE BV	NL	3.397
	Computational Intelligence	WILEY-BLACKWELL PUBLISHING, INC	US	3.310
	Journal of Machine Learning Research	MICROTOME PUBL	US	3.116
	Neural Networks	PERGAMON-ELSEVIER SCIENCE LTD	UK	2.656
	Machine Learning	SPRINGER	US	2.326
Telecommunications	IEEE Journal on Selected Areas in Communications	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	4.249

	IEEE Network	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	3.068
	IEEE Communications Magazine	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	2.799
	IEEE-ACM Transactions on Networking	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	2.576
	IEEE Internet Computing	IEEE COMPUTER SOC	US	2.309
	IEEE Transactions on Multimedia	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	2.288
	IEEE Transactions on Communications	IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC	US	2.070
	Computer Networks	ELSEVIER SCIENCE BV	NL	1.304
	Telecommunication Systems	SPRINGER	NL	0.396
	European Transactions on Telecommunications	JOHN WILEY & SONS LTD	GE	0.472
	International Journal of Communications Systems	JOHN WILEY & SONS LTD	UK	0.394
Computer Science, Interdisciplinary Applications	Journal of Network and Computer Applications	ACADEMIC PRESS LTD ELSEVIER SCIENCE LTD	UK	1.000

Table 4. Candidate Journals and Magazines

Table 5 is collects details on publications from the Ocean consortium; it will be updated in the subsequent D7.4.

<i>Ref</i>	<i>Journal</i>	<i>Title</i>	<i>Publisher</i>	<i>Impact Factor</i>	<i>Partners</i>	<i>Publishing Date</i>
(1)	Multimedia	Priority-	Springer		FRAUNHOFER	November

	<i>Tools and Applications, Springer Science+Business Media, LLC 2010, September 2010</i>	<i>based Media Delivery using SVC with RTP and HTTP Streaming</i>	<i>Science+Business Media</i>			<i>2010</i>
(2)	<i>Elsevier Signal Processing: Image Communication, Special Issue: DASH/MMT.</i>	<i>Efficient HTTP-based Streaming using Scalable Video Coding</i>	<i>Elsevier</i>		<i>FRAUNHOFER, FT, ALU, N2N</i>	<i>2011</i>

Table 5. OCEAN publications in Journals and Magazines

Besides the OCEAN project aims to communicate on its research studies towards the public with publications in daily newspapers and dedicated magazines.

As an illustration, the OCEAN project had joint sessions with both European projects ETICS and ENVISION during its plenary meeting in September 2010 in Lannion, France. The OCEAN consortium took this opportunity to publish articles on OCEAN in the major local daily newspapers (“Ouest-France” and “Le Télégramme”). An article on OCEAN was also published in the fifth issue of “EBU Tech-I Magazine”, the quarterly technical magazine from the EBU [ITECH].

2.3.4.1 Details on Conference papers and Events listed in Table 5

(1) T. Schierl, Y. Sanchez, R. Globisch, C. Hellge, T. Wiegand, " Priority-based Media Delivery using SVC with RTP and HTTP Streaming," Multimedia Tools and Applications, Springer Science+Business Media, LLC 2010, September 2010.

Abstract

Media delivery, especially video delivery over mobile channels, may be affected by transmission bitrate variations or temporary link interruptions due to changes in the channel conditions or the wireless interface. In this paper, we present the use of Priority-based Media Delivery (PMD) of Scalable Video Coding (SVC) to overcome link interruptions and channel bitrate reduction in mobile networks by performing a transmission scheduling where media data is treated unequally depending on its importance. The presented approach comprises a media priority-based pre-buffer to overcome phases under reduced connectivity. The PMD framework aims to use the same transmission bitrate and overall buffer size as the traditional streaming approach. In order to overcome interruptions and phases with reduced bitrate, PMD is used to achieve longer continuous playback than the traditional approach without stops in the video playout and thus improves the video playback quality. We analyze the use of SVC with PMD in the traditional RTP streaming and in the adaptive HTTP streaming context. We show benefits of using SVC in terms of received quality during interruption and re-buffering time, i.e. phase to fill a desired pre-buffer at the receiver. We present a quality optimization approach for PMD and show results for different interruption/bitrate-reduction scenarios.

(2) Y. Sanchez, T. Schierl, S. Hesse, C. Hellge, T. Wiegand, Dohy Hong, Danny De Vleeschauwer, Werner Van Leekwijck, Yannick Le Louédec, “ *Efficient HTTP-based Streaming using Scalable Video Coding*,” *Signal Processing: Image Communication* (October 2011)

Abstract

HTTP-based video streaming has been gaining popularity within the recent years. There are multiple benefits of relying on HTTP/TCP connections, such as the usage of the widely deployed network caches to relieve video servers from sending the same content to a high number of users and the avoidance of problems with firewall and NAT traversal when RTP/UDP-based solutions are considered. Therefore, many service providers resort to adopt HTTP streaming as the basis for their services. It is known that traditional HTTP-based streaming solutions require typically a large play-out buffer, which makes them less suitable for live applications. In this paper, we show how the benefits of the traditional techniques can even be heightened by adopting the Scalable Video Coding (SVC) as the video codec for adaptive live streaming over HTTP. Small playout-buffers are considered hence allowing low media access latency in the delivery chain. As presented in this work, HTTP-based Streaming based on SVC enhances the network caching performance, adaptability at clients and allows for exploiting the available network throughput in a more effective way.

2.3.5 Participation to Conferences and Events

Dissemination is also implemented through participation to conferences, events, industry meetings, exhibitions or large fairs. Candidate events and conferences for presentations by OCEAN partners include both technical and business oriented conferences and events in which relevant stakeholders of the online video industry interact. Such participation consists in delivering presentations and/or in having a stand with posters. As an illustration, OCEAN project had a poster on the EC Future Media Networks Cluster exhibition at ICT 2010 [ICT2010] and at NEM summit 2010 [NEM03]. Further poster presentations and brochures/flyers will be produced as appropriate.

The following overview table lists the conferences and events with participation from OCEAN partners.

Details on each item listed in Table 6 are reported in Section 2.3.5.1

Ref	Conference	Title	Countries addressed	Partners	Publishing Date
(1)	IEEE ICME 2010	Intra-Burst Layer Aware FEC for Scalable Video Coding Delivery in DVB-H	Worldwide	Fraunhofer	July 2010
(2)	Internet 2010	On the Use of Reservoir Computing in Popularity Prediction		ALU	September 2010
(3)	Informa CDN	Presentation	Worldwide	IDATE, FT	September

	World Summit	“Evolution of the CDN market” and presentation “Open ContEnt Aware Networks”			2010
(4)	3rd EU-Japan Symposium on Future Internet and New Generation Networks	Presentation “Open ContEnt Aware Networks”	EU-Japan	OCEAN	October 2010
(5)	EBU Forecast 2010	Advanced CDN and P2P Solutions	Europe	FT	November 2010
(6)	Netcoop 2010	A Chunk-based Caching Algorithm for Streaming Video		ALU, N2N	November 2010
(7)	Content adaptation workshop - 6th FP7 Networked Media Concertation Meeting	Improved caching for HTTP-based Video on Demand using Scalable Video Coding	Europe	OCEAN	December 2010
(8)	CCNC 2011	Improved caching for HTTP-based Video on Demand using Scalable Video Coding	Worldwide	FRAUNHOFER, ALU, N2N, FT	January 2011
(9)	MMSys 2011	iDASH: Improved Dynamic Adaptive Streaming over HTTP using Scalable Video Coding	Worldwide	FRAUNHOFER, ALU, N2N, FT	February 2011
(10)	IM2011	On the Merits of Popularity Prediction in Multimedia Content Caching	Worldwide	IBBT	May 2011
(11)	DigiWorld Summit	CDN and Transparent caching	Europe	IDATE	November 2011

		in Net Neutrality Context			
(12)	3rd IFIP/IEEE International Workshop on Management of the Future Internet	Optimized Network Utilisation through Buffering in PCN enabled Multimedia Access Networks	Worldwide	IBBT	May 2011
(13)	PCM 2011	CDNs with DASH and iDASH using Priority Caching	Worldwide	FRAUNHOFER, ALU, N2N, FT	December 2011
(14)	EBU BroadThinking 2011	New Generation Content Distribution Networks	Europe	FT	March 2011
(15)	FP7 ETICS Workshop	OCEAN and IETF CDN Interconnection Activities	-	OCEAN	June 2011
(16)	CDN World Summit 2011	Presentation "Content Delivery Network Interconnection"	Worldwide	TP / Orange Labs Poland	October 2011
(17)	EBU Forecast 2011	Open Content Aware Networks	Europe	OCEAN	November 2011
(18)	FP7 COMET-ENVISION workshop on Future Media Distribution Networks	New Generation Open Content Delivery Networks	Europe	FT	November 2011

Table 6. Conferences and events with OCEAN dissemination

The following overview table lists the potential conferences and events for OCEAN dissemination in 2012.

Conference	Countries addressed	Partners	Event Date
CDN World Summit	Europe	IDATE	October 2012
Streaming Media	US	IDATE	May 2012

CDN World Forum	Europe	IDATE	June 2012
CDN World Forum Asia	Asia	IDATE	December 2012
Broadband World Forum	Europe	IDATE	October 2012

Table 7. Candidate conference and events for OCEAN dissemination

2.3.5.1 Details on Conference papers and Events listed in Table 6

(1) C. Hellge, D. Gomez-Barquero, T. Schierl, T. Wiegand, "Intra-Burst Layer-Aware FEC for scalable video coding delivery in DVB-H," 2010 International Conference on Multimedia and Expo (ICME 2010), Singapore, Singapore, 19-23 July 2010.

Abstract: This paper investigates how Scalable Video Coding (SVC) can benefit from different Forward Error Correction (FEC) and transmission schemes in mobile broadcast systems. Simulation are performed in DVB-H (Digital Video Broadcasting – Handheld) systems. In DVB-H, a differentiation in robustness for the different SVC layers can be achieved at the link layer using intra-burst MPE-FEC (multi-Protocol Encapsulation FEC). The paper evaluates the gain that can be achieved with the MPE-FEC using equal (EEP) and unequal error protection (UEP), and the performance improvements of an SVC layer-aware FEC (LA-FEC) approach that can be implemented in DVB-H either at the link layer with MPE-iFEC (inter-burst MPEFEC) or at the application layer with AL-FEC. LA-FEC improves the SVC base layer robustness generating parity information across existing dependencies within the SVC video coding structure. Laboratory measurement results using a TU6 channel model show that the performance of an SVC service in DVB-H can be significantly increased by a proper link layer FEC scheme. It is shown that using SVC in combination with LA-FEC and a proper transmission scheduling does not only give a better performance in terms of PSNR and amount of video outages compared to a single layer service at the same service bit rate, but also gives an additional lower quality layer which can be used for applications like conditional access.

(2) T. Wu, M. Timmers, D. De Vleeschauwer, W. Van Leekwijck, "On the Use of Reservoir Computing in Popularity Prediction," The Second International Conference on Evolving Internet (Internet 2010), Valencia, Spain, 20-25 September 2010.

Abstract: Predicting the life cycle and the short-term popularity of a Web object is important for network architecture optimization. In this paper, we attempt to predict the popularity of a Web object given its historical access records using a novel neural network technique, reservoir computing (RC). The traces of popular videos at YouTube for five continuous months are taken as a case study. We compare RC with existing analytical models. Experimental results show that RC, given a 10-day trace composed of daily cumulative views for a video, is able to predict the next-day's popularity with less than 5% relative square errors (RSEs). It is also demonstrated that RC achieves the best prediction performance among all compared models in longer-term prediction. The advantages and limitations of using RC in popularity prediction are discussed.

(3) Two presentations were delivered by delegates from OCEAN consortium at the CDN World Summit (London, 28-29 September 2010) [CDNWS]

- V. Bonneau, "Evolution of the CDN market" ;

- G. Bertrand, Y. Le Louédec, "Open ContEnt Aware Networks".

The CDN World Summit is a major conference for the market players from the CDN Industry. Therefore it constitutes a great opportunity for OCEAN to communicate on its objectives and to disseminate its outcomes. The first presentation is relating to OCEAN Work Package WP2, highlighting service and business stakes in CDN market. The second presentation is relating to OCEAN Work Package WP3, with a focus on Content Network Interconnection.

(4) Y. Le Louédec, "Open ContEnt Aware Networks", 3rd EU-Japan Symposium on Future Internet and New Generation Networks. Tampere, Finland, 20-22 October 2010 [EUJAPAN].

The objective of the Commission services is to explore, with the support of the relevant research communities, the possibilities to implement concrete joint research activities with the participation of Japanese organisations in the context of the FP7 ICT Work Programme 2011-2012. OCEAN registered and prepared a presentation focusing on its objectives and research studies. The delegate could not attend to due unexpected and unmanageable reasons (strikes in France) but the presentation was made available to attendees.

(5) Y. Le Louédec, "Advanced CDN and P2P Solutions", EBU Forecast 2010, Geneva, 17 novembre 2010 [EBU2010].

EBU Forecast is "The Annual Update for EBU Members". This is a 2-day event providing insights on spectrum and content delivery technology to broadcasters from all Europe. A delegate from OCEAN had been invited to deliver a presentation on advanced CDN and P2P solutions. This constituted an opportunity to communicate towards the Broadcaster community on key developments achieved in the OCEAN project.

(6) D. Hong, D. De Vleeschauwer, F. Baccelli, "A Chunk-based Caching Algorithm for Streaming Video," 4th Workshop on Network Control and Optimization (NET_COOP'10), Ghent, Belgium, 29 November - 1 December 2010.

Abstract: It is customary nowadays that large web objects are cached somewhere close to the user. This saves traffic upstream of the cache and offers the users a better responsiveness. Caching algorithms typically rank the objects in some way and cache the top-ranked objects. In this paper we study a scenario in which a requested video is (instantaneously) streamed to the user and in which the video library is highly dynamic: new videos are frequently introduced, get popular, get consumed and fade away. Caching streaming videos differs from caching traditional web objects as the former are consumed as their information trickles in, while the latter have to be downloaded (almost) completely before they can be consumed. We develop a caching algorithm specifically for streaming video taking into account the dynamicity of the library. First we make sure that its ranking algorithm can follow the dynamicity of the library (better than traditional algorithms can). Second we segment each video in chunks and propose a new algorithm to rank these chunks. We compare the performance of caching based on this new ranking algorithm with traditional caching algorithms and show that chunking is most beneficial.

(7) OCEAN, "Improved caching for HTTP-based Video on Demand using Scalable Video Coding", Content adaptation Workshop, FMN Cluster session of the 6th FP7 Networked Media Concertation Meeting, Brussels, November 30, 2010 [CAW]

OCEAN concentrated its contribution to the Content Adaptation Workshop arranged during the FMN Cluster session of the 6th FP7 Networked Media Concertation Meeting on presenting the key outcomes of the paper entitled "Improved caching for HTTP-based Video on Demand using Scalable Video Coding", accepted to CCNC 2011 (see below).

(8) Y. Sanchez, T. Schierl, C. Hellge, T. Wiegand, D. Hong, D. De Vleeschauwer, W. Van Leekwijck, Y. Lelouedec, "Improved caching for HTTP-based Video on Demand using Scalable Video Coding, " Consumer Communication & Networking Conference 2011 (CCNC 2011), Special Session on IPTV and Multimedia CDN, Las Vegas, Nevada, USA, 9-12 January 2011.

Abstract: HTTP-based delivery for Video on Demand (VoD) has been gaining popularity within the recent years. Progressive Download over HTTP, typically used in VoD, takes advantage of the widely deployed network caches to release video servers from sending the same content to a high number of users in the same VoD service. However, due to the inherent heterogeneity of user demands, which may result in requesting the same video content in different resolutions or qualities, the caching efficiency is expected to decrease due to a higher variety in requested media files. In case using Scalable Video Coding, different representations of the same content can be combined in a single file, whose parts, aka layers, are requested sequentially by a user up to the maximum desired quality. In this paper we show the benefits of using the Scalable Video Coding to maintain the same set of possible video content representations, while at the same time keeping the caching efficiency at its highest possible value.

(9) Y. Sanchez, T. Schierl, C. Hellge, T. Wiegand, D. Hong, D. De Vleeschauwer, W. Van Leekwijck, Y. Lelouedec, "Improved caching for HTTP-based Video on Demand using Scalable Video Coding," Workshop on Content Adaptation, 6th FP7 Networked Media Concertation Meeting, 30 November 2010.

Abstract—HTTP-based delivery for Video on Demand (VoD) has been gaining popularity within recent years. Progressive Download over HTTP, typically used in VoD, takes advantage of the widely deployed network caches to relieve video servers from sending the same content to a high number of users in the same access network. However, due to a sharp increase in the requests at peak hours or due to cross-traffic within the network, congestion may arise in the cache feeder link or access link respectively. Since the connection characteristics may vary over the time, with Dynamic Adaptive Streaming over HTTP (DASH), a technique that has been recently proposed, video clients may dynamically adapt the requested video quality for ongoing video flows, to match their current download rate as good as possible. In this work we show the benefits of using the Scalable Video Coding (SVC) for such a DASH environment.

(10) J. Famaey, F. Iterbeke, T. Wauters, F. De Turck, "On the Merits of Popularity Prediction in Multimedia Content Caching," IEEE International Symposium on Integrated Network Management, Dublin, Ireland, 23-27 May 2011.

Abstract: In recent years, telecom operators have been moving away from traditional, broadcast-driven, television towards IPbased, interactive and on-demand services. Consequently, multicast is no longer a viable solution to limit the amount of traffic in the IP-TV network. In order to counter an explosion in generated traffic, caches can be strategically placed throughout the content delivery infrastructure. As the size of caches is usually limited to only a small fraction of the total size of all content items, it is important to accurately predict future content popularity. Classical caching

strategies only take into account the past when deciding what content to cache. Recently, a trend towards novel strategies that actually try to predict future content popularity has arisen. In this paper, we ascertain the viability of using popularity prediction in realistic multimedia content caching scenarios. The use of popularity prediction is compared to classical strategies using trace files from an actual deployed Video on Demand service. Additionally, the synergy between several parameters, such as cache size and prediction window, is investigated.

http://www.ict-ocean.eu/private-area/wp7/dissemination-assets/jfamaey-im2011-accepted.pdf/at_download/file

(11) IDATE arranges DigiWorld Program events related to OCEAN findings through its existing line of events like DigiWorld Summit. DigiWorld Program is a think tank focused on the future of the telecom, media and Internet industries bringing together major stakeholders of the OCEAN ecosystem, including telecom operators, equipment vendors, content providers and technology vendors.

(12) K. Roobroeck, S.Latre, T. Wauters, F. De Turck, "Optimized network utilisation through buffering in PCN enabled multimedia access networks," 2011 IFIP/IEEE International Symposium on Integrated Network Management (IM), Dublin, Ireland, 2011.

Abstract: With the advent of novel services such as IPTV and videoconferencing broadband DSL networks are facing enormous challenges. These services have strict QoS demands in terms of packet loss, jitter and delay. In an effort to meet these demands, operators introduced centralized admission control mechanisms to avoid congestion when too many session were allowed. These centralized approaches often fail to effectively manage the available resources mainly because of the bursty nature of multimedia traffic. When transmitting variable bit rate videos resources are reserved based on the peak rate of the video. This leads to under-utilisation of the network. Measurement based admission control mechanism have been proposed such as the IETF Pre-Congestion Notification (PCN) to allow better network utilisation. Each node in the PCN domain measures the network load and admits or blocks accordingly sessions at the edges of the network. Previous research proposed bandwidth metering and an autonomic rate adaptation algorithm which led to a better utilisation of the network but still introduced unnecessary bandwidth headroom caused by the variable bit rate of videos. In this paper, we propose an additional buffering step before traffic enters the PCN domain and determine configuration guidelines for the parameters. The performance of this buffering step has been evaluated in an NS-2 based simulator environment. The conducted tests show a 26.5% increase of network utilisation.

http://www.ict-ocean.eu/private-area/wp7/dissemination-assets/manfi2011-submitted.pdf/at_download/file

(13) C. Hellge, Y. Sanchez, T. Schierl, D. Hong, Y. Le Louedec, T. Wiegand, and Danny De Vleeschauer "CDNs with DASH and iDASH using Priority Caching," The 2011 Pacific-Rim Conference on Multimedia (PCM 2011), Sidney, Australia, December 2011.

Abstract. Global Internet traffic shows an upward trend with annual growth rates as large as 50%. The share of video streaming and download services is growing and takes an increasingly large proportion of the total bandwidth. In addition the success of mobile network technologies and the further spread of mobile Internet lead to an increased diversification of access data rates and internet terminals like smartphones, tablets, or laptops. In such a context, Content Delivery Networks (CDNs)

are forced to offer all content in multiple versions for different resolutions. Moreover multiple bitrates (also referred to as “adaptation points” are needed, such that emerging adaptive streaming technologies are enabled to adapt to network congestion. The enormous proliferation of different versions of each content becomes a challenge for the efficiency of existing network and caching infrastructure. I.e. network operators start to implement local network caches enabling serving popular content directly from the cache instead of forwarding it through the whole network. Most of today’s video traffic is delivered via HTTP. Dynamic Adaptive Streaming over HTTP (DASH) is an emerging MPEG-Standard which enables adaptation of the media bitrate to varying throughput conditions by offering multiple representations of the same content. The combination of SVC with DASH, called improved DASH (iDASH) consists basically of relying on SVC to provide the different representations offered by a DASH service. iDASH has shown to improve the performance of caching infrastructure. This paper shows how prioritized caching strategies can further improve the caching performance. We also study the impact on the revenue of the different strategies based on a simple model introduced in this paper. We show that there is a clear benefit in the revenue for service providers when iDASH is used and we show that priority caching further increases this revenue.

(14) Y Le Louédec, “New Generation Content Distribution Networks”, EBU BroadThinking 2011, Geneva, 29 March 2011.

A delegate from OCEAN delivered a presentation entitled “New Generation Content Distribution Networks” focusing on two major topics: first CDN interconnection, second HTTP adaptive streaming and media-aware caching: solutions investigated by OCEAN to improve quality of service and caching efficiency for segmented video streaming, in particular for HTTP Adaptive Streaming (HAS).

(15) G Bertrand, “[OCEAN and IETF CDN Interconnection Activities](#)”, 2nd FP7 ETICS Workshop, June 1st, 2011, Versailles, France.

A delegate from OCEAN delivered a presentation entitled “OCEAN and IETF CDN Interconnection Activities” highlighting the stakes and status of recent works on-going in standardization bodies on CDN interconnection, including all the drafts and actions authored by OCEAN partners which successfully contributed to the launch on June 2011 of a dedicated WG at IETF on CDN interconnection (CDNi WG).

(16) M Pilarski, “Content Delivery Network Interconnection”, CDN World Summit 2011, London 25th-28th October 2011.

This presentations reports on TP activities on CDN and CDN interconnection, including on the first commercial CDN Interconnection achieved between two Telco CDNs in Europe, as well as the requirements and the proposed methods and mechanisms to implement request routing in multi-CDN systems.

(17) G Fontaine, “Open Content Aware Networks”, EBU Forecast 2011, Geneva, 9-10 November 2011.

EBU Forecast is “The Annual Update for EBU Members”. This is a 2-day event providing insights on spectrum and content delivery technology to broadcasters from all Europe. A delegate from OCEAN had been invited to deliver a presentation on advanced CDN solutions. This constituted an

opportunity to communicate towards the Broadcaster community on key developments achieved in the OCEAN project.

(18) Y Le Louédec, “New Generation Open Content Delivery Networks”, FP7 COMET-ENVISION workshop on Future Media Distribution Networks, Slough (London), 10-11 November 2011.

A range of solutions have been proposed to mitigate some of today's Internet's problems, including caching and load-balancing techniques in CDNs; and various research initiatives are investigating alternative approaches, including native information-centric network technologies, dynamic adaptation of content and optimisation of overlay networks. The goal of this workshop was to explore the range of solutions offered by state-of-the-art research initiatives and to seek answers to questions such as:

- *Should content access, storage and delivery be decoupled from the network-layer or are there significant advantages in a more tightly coupled content-aware network infrastructure?*
- *Do the advantages offered by an information-centric network layer outweigh the costs of deploying a new infrastructure? Are there hybrid solutions that achieve the performance and usability gains without impacting today's network? Do we need a new clean slate approach or is current IPv4/IPv6 sufficient?*
- *To what degree should applications and overlay networks cooperate with underlying networks to optimise content delivery, reducing infrastructure cost and improving Quality of Experience for the user?*
- *How should content be pushed closer to end-users to reduce inter-domain traffic and other delivery costs? How can CDNs interwork and cooperate with one other to balance load and extend geographical reach?*

A delegate from OCEAN delivered a presentation entitled “New Generation Open Content Delivery Networks” highlighting the stakes and status of recent works on-going in standardization bodies, especially at IETF, on CDN interconnection, including the draft submitted by the EC's FMN cluster and co-authored by OCEAN project two weeks before the workshop: “Catalogue of Advanced Use Cases for Content Delivery Network Interconnection” (draft-fmn-cdni-advanced-use-cases-00).

2.3.6 OCEAN Open Events (Workshops)

EBU hosted one open event and one more is planned (workshop) related to findings and requirements of OCEAN's WP2 (“Service Definition & Economics”), that will also help for dissemination.

WP2 aims at understanding the context for future content delivery architectures and preparing future-proof go-to market strategies. This leads to active work in Business fields through the following key actions:

- Analyze the consumption patterns from end-users and their expectations regarding new content services through quantitative surveys and focus groups
- Assess the perception of stakeholders (content providers, media distributors, regulators, content delivery service providers, network operators, telecom operators) regarding the current state and the future of online media content offerings and strategies
- Anticipate on possible evolution of regulation ecosystem

-
- Define specific service use cases derived from expected future offerings and demand
 - Derive market and business elements related to online media content delivery in the current context and in the future

Both OCEAN and EBU members should mutually benefit and should be able to learn from each other via these workshops. EBU Members should be informed about the OCEAN project and its objectives, and also of some findings of WP2. OCEAN Members should obtain some feedback about technical, commercial and operational requirements from content providers and broadcasters. More globally the ultimate success of the OCEAN project would be the widespread adoption of its recommendations by the market stakeholders. Therefore the project intends to have in-depth exchanges with the different types of market stakeholders and to make public its results. So even if these workshops are first targeting EBU members (content broadcasters/providers), the objective is also to get the other types of players involved in the content delivery chain over Internet be represented.

A first workshop was arranged on September 7th, 2010 at EBU Headquarter in Geneva to get feedback on requirements from content providers before the design of OCEAN solutions [EBUWS]. The participants were content providers from the EBU, but also equipment manufacturers (ALU and Cisco for example), technology providers (Seawell), telcos (Orange and Globecast for example) and CDN service providers (Akamai).

A second workshop will take place in 2012 to exchange on the OCEAN potential offerings based on technologies developed inside the consortium to disseminate early findings.

2.4 External Collaboration

The OCEAN project intends to develop collaboration with research projects sharing common objectives with OCEAN, and to contribute to coordination initiatives and activities such the NEM technology platform initiative and the Future Internet Assembly (FIA) initiative.

2.4.1 Collaboration with research projects

Some opportunities for external collaboration with other research projects such as ENVISION and COAST are identified.

2.4.1.1 Cooperation with ENVISION

ENVISION (Enriched Network-aware Video Services over Internet Overlay Networks) is a new ICT project, which started in January 2010 for 3 years. It will allow Internet overlay networks to interact better with Internet Service Providers' networks. Services like video-on demand, live streaming of 3D TV, high quality network games, virtual and augmented reality are increasingly built based as overlay application networks. ENVISION will foster the cooperation of these future overlay applications and the ISP by defining an interface that will enable the applications to use specific functions to access higher quality connections, more computing power, help with selecting nearby peers to avoid congested paths, etc. The goal is to find the most suitable techniques to achieve this cooperation so that both the users and the ISPs will benefit. The user will get a better quality of experience and the ISPs will be able to influence the way overlay applications inject traffic into their networks so that

they can better optimise their usage, reduce congestion and even get paid by the users for using these features.

ENVISION and OCEAN have therefore both the objective of improving the user's QoE offered by the overlay applications, by (1) a close cooperation between overlay providers and network operators, (2) the activation of network services provided by operators and (3) the use of content adaptation modules.

Having common goals, ENVISION and OCEAN agreed to arrange a first common session during their respective quarterly plenary meetings in Lannion, France, in September 2010. The objective of this session is to let each project present to the other its vision of the evolution of the content distribution networks, to share their understanding of the technical and economic drivers behind, and to identify possible opportunities for deeper collaboration during their project life.

2.4.1.2 Cooperation with COAST

COAST (Content Aware Searching, retrieval and sTreaming) is a new ICT project, which started in February 2010 for 30 months. It aims to build a Future Content-Centric Network (FCN) architecture, able to offer network-wide Service Level Agreements (SLAs) in service discovery and content consumption. In COAST FCN, the users will specify solely which content or web service they need and the COAST framework will find and deliver the desired or the most relevant data in an efficient, timely, user-/network-friendly way. To achieve this goal, COAST will focus on three key innovation pillars:

- On the fly identification and distributed on-line discovery: COAST will create a content-aware network of intelligent nodes, which will a) on the fly (at wire speed) identify/classify content and identify Web services via inspection of the traffic that flows through the nodes and b) discover online (in a distributed manner), where services are located and content is located/cached, in order to optimally match users requests with availability;
- Content-Aware Delivery Architecture: COAST will discover the underlying network infrastructure (including mobile networks), and construct content-aware overlays to offer distributed and robust content delivery with optimal utilisation of the networking topology and resources, leading to improved QoS;
- Future media content adaptation and enrichment: COAST will provide for scalable, HD 3D/free-viewpoint video, which is on-the-fly adapted, enriched and optimized to the user preferences, network and terminal characteristics [COAST].

Having common goals, OCEAN and COAST arranged common session during their respective quarterly plenary meeting in Berlin, Germany, in June 2011. The objective of this session is to let each project present to the other its vision of the evolution of the content distribution networks, to share their understanding of the technical and economic drivers behind, and to identify possible opportunities for deeper collaboration during their project life.

2.4.1.3 Cooperation with OPTIBAND

OptiBand ("Optimization of Bandwidth for IPTV video") is a new ICT project, which started in January 2010 for 30 months. It focuses on optimizing the bandwidth of IPTV for the delivery of multiple HD streams over a single ADSL line, and by that enabling multiple HD channels per household.

OptiBand conducts in-depth research and development regarding the efficient distribution of video content using smart data drop algorithm within the telecommunication aggregation networks, while preserving quality of experience according to both objective and subjective metrics.

While preserving existing IPTV networks models and leaving existing infrastructures intact, OptiBand introduces innovative technology of encoding, streaming and transporting of video content from head-end sites, through the entire IPTV network, down to the home networks.

The consortium will conduct design, development, integration and demonstration of the video content data dropping algorithm. The video content data dropping algorithm technology will be introduced through simulations, lab integration and trial by real IPTV users in Telecom Italy.

In the global economy environment, cost optimization and investment protection are mandatory requirements for any business decision. Therefore, leveraging the European and worldwide existing ADSL deployments and providing seamless integration to existing solutions and encryption schemes are keys to the success of OptiBand.

OptiBand consortium gathers leading operator, vendors and research entities in order to consider the entire IPTV network, including economical aspects, of delivering premium video content over existing installed base.

OCEAN shares common partners and common objectives on future media content adaptation systems. Both projects will consider carefully the evolution and production from each other, and will investigate opportunities for collaboration as and when appropriate.

2.4.2 Collaboration and coordination activities

2.4.2.1 Networked Media Systems unit

The Networked Media Systems unit of the EC FP7 program aims to ensure that Europe plays an important role in the Future Networked Media world.

Networked Media rely on the technological process known as Convergence, thanks to which all kinds of media including text, image, 3D graphics, audio and video produced can be distributed, shared, managed and consumed through various networks, like the Internet, be it via Fiber, WiFi, WiMAX, GPRS, 3G and so on, in a convergent manner. Networked Media also encapsulates the concept of a decentralized medium of mass communication, in which the audience can actively contribute to the production of the media. As the Internet has revolutionised the access to multimedia content and enabled collaborative user-generated content (UGC), requirements in this field have huge impact for the Future Internet. At the same time advances in audiovisual technologies such as Digital Cinema and 3D processing increase the level of immersion and the quality of the experience (QoE), but also give rise to innovative applications, notably in gaming technologies and in virtual worlds. In essence, Networked Media are decentralized media of mass communication, whose value chain features a network capacity, which can allow co-operative and collaborative practices enabling users to contribute to the production of the new media [NETMED1].

OCEAN project is affiliated to the Networked Media Systems unit and is participating to its actions and events:

- Delegates from OCEAN consortium have attended to all FP7 Networked Media concertation meetings since the project launch ;

- As listed in Section 2.3.5, OCEAN registered and prepared a presentation on “Open Content Aware Networks” for the 3rd EU-Japan Symposium on Future Internet and New Generation Networks (Tampere, Finland, 20-22 October 2010) [EUJAPAN] ;
- OCEAN has contributed to the EC publication “Networked Media - Current Research, Results and Future Trends” (February 2010) [NETMED2].

2.4.2.2 Future Media Networks cluster

The Future Media Networks cluster of the EC FP7 program is formed from the projects in the Networked Media Systems unit that are concerned with the algorithms, protocols, techniques, tools and platforms for the support, by future networks, of advanced interactive media applications and the seamless delivery of a range of content including text, images, audio-visual streams and 3D media, virtual and augmented worlds, and games.

The approach of the projects in this cluster is based around the idea that the development of future Internet technologies should not proceed in isolation of the way the networks are used. The projects start from the point of view of the demanding network problems posed by distributed media applications and content delivery systems. The cluster is therefore in a privileged position to research novel networking solutions in the context of such demanding usage drivers.

The cluster provides a forum for the exchange of ideas between projects, facilitating the harmonisation of views on topics of common interest as well as building a comprehensive view of complementary and alternative solutions.

The projects in the cluster have a spectrum of approaches to the networking of such applications and content, ranging from P2P overlays that make no assumptions on the underlying network through to visionary and potentially disruptive novel network architectures that are able to access, discover and route content natively. Topics of common interest that are currently under investigation include:

- Network architectures for supporting advanced media applications, including:
 - evolutionary approaches such as overlay networks,
 - interim solutions through techniques such as deep packet inspection and network virtualisation,
 - visionary networking such as native content-centric networking,
 - migration paths and roadmaps towards interim and visionary architectures;
- Adaptation of content to network capabilities, including scalable video coding;
- P2P applications and their interaction with underlying networks;
- Distributed versus centralised media/content servers;
- Positioning of caching functions for content distribution systems;
- Business models investigating alternative relationships between content producers, users, service providers, ISPs and CDNs;
- Personalisation and enrichment of media/content according to user context;
- Development of QoE metrics and accountability means to determine the entities responsible for QoE degradations;

The cluster will interact with the other clusters of the Networked Media Systems unit:

- to identify demanding media application requirements from those projects more focussed on the media applications themselves;
- to investigate the overlap between content networking and distributed A/V search [FMN].

OCEAN is an active member of the cluster, participating in the cluster actions and events:

- Delegates from OCEAN consortium were present with a poster of the OCEAN project on the FMN cluster exhibition at ICT2010 (Brussels, 27-29 September 2010) [ICT2010] and at the NEM Summit 2010 (Barcelona, 14-15 October 2010 [NEM03] ;
- OCEAN has contributed to the EC publication “Future Media Networks Research Challenges 2010” (September 2010) [FMNRC] ;
- As mentioned in section 2.3.5, OCEAN delivered a presentation entitled “Improved caching for HTTP-based Video on Demand using Scalable Video Coding” at the Content Adaptation Workshop” arranged during the FMN Cluster meeting in Brussels on November 30, 2010 [CAW].

2.4.2.3 Future Internet Assembly

The European Future Internet Assembly (FIA) is an initiative supported by the European Commission. FIA is a collaboration between projects that have recognized the need to strengthen European activities on the Future Internet to maintain European competitiveness in the global marketplace. In particular, they have identified the urgent necessity to redesign the Internet, taking a broad multidisciplinary approach, to meet European societal and commercial ambitions. The purpose of the Future Internet Assembly is to foster open interactions and cross-fertilisation across technical Future Internet domains [FIA01] [FIA02].

OCEAN shall actively participate to the Future Internet Assembly (FIA) initiative. Several consortium members have been active participants of the Future Internet Assembly since its first meeting in Bled in 2008. The FIA event of December 2010 in Ghent is coordinated and hosted by IBBT which is a member of the OCEAN consortium.

2.4.2.4 NEM Technology Platform

Networked and Electronic Media (NEM) is one of the European Industrial Initiatives, also known as Technology Platforms, established by relevant key European stakeholders, which address the convergence of media, communications, consumer electronics, and IT as a wide opportunity for future growth, by taking advantage of generalized broadband access, increased mobility, availability of richer media formats and contents, as well as new home networks and communication platforms. The NEM Initiative is committed to helping our industry practitioners and researchers to drive the future of media and content consumption [NEM01].

NEM summits [NEM02] feature cutting edge exhibitions to showcase and stimulate discussions of the latest findings and trends of R&D for the networked & electronic media area. After the success of the previous editions, the 2010 NEM Summit is expected to gather several hundred representatives from the networked and electronic media area in Europe and worldwide, including corporations, SMEs and start-ups, research centres and institutions, industry associations and groups, and standardization bodies. It will be a key opportunity for all stakeholders to share experience and research results, identify future trends, and discuss opportunities for research collaboration (including under the ICT theme of FP7).

OCEAN intends to actively contribute to NEM objectives. OCEAN was present at the last NEM summit in October 2010 with a poster outlining its objectives and innovative technical approaches for large scale content delivery over the Internet [NEM03].

2.5 Summary

Table 8 gives a summary on the collaboration activities of the OCEAN project.

Collaboration activity	Place	Date	Future actions
FP7 EC Concertation meeting and FMN Cluster meeting Presentation of OCEAN project during the plenary meeting	Brussels, Belgium	3-4 February 2010	
Contribution to the EC publication "Networked Media - Current Research, Results and Future Trends" [NETMED]	NA	February 2010	
Contribution to the EC publication "Future Media Networks Research Challenges 2010" [FMNRC]	NA	September 2010	
OCEAN/EBU Workshop on Internet Content Distribution [EBUWS]	Geneva, Switzerland	7. September 2010	Participation to EBU Broadthinking 2011
Joint sessions with both European projects ETICS and ENVISION	Lannion, France	14-16 September 2010	
ICT2010 OCEAN on FMN cluster booth	Brussels, Belgium	27-29 September 2010	
NEM Summit 2010 OCEAN on FMN cluster booth	Barcelona, Spain	13-15 October 2010	
3rd EU-Japan Symposium on Future Internet and New Generation Networks Presentation on "Open Content Aware Networks" [EUJAPAN].	Tampere, Finland	20-22 October 2010	
FP7 EC Concertation meeting and FMN Cluster meeting OCEAN Presentation on "Improved caching for HTTP-based Video on Demand using Scalable Video Coding" [CAW]	Brussels, Belgium	29-30 November 2010	
Joint sessions with COAST	Berlin, Germany	9 June 2011	
FP7 FMN Cluster arranged on July	NA	20 July 2011	Potential draft for



20 th a conf call on potential draft for IETF CDNI WG.			IETF CDNI
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Table 8: Summary on collaboration activities

3. EXPLOITATION

This section provides an initial outline of OCEAN project's exploitation. In this section we will define the general strategy for coordinating the different partners' exploitation plans during the life time of the project. Implementation of these plans is an ongoing process that will be updated as the project progresses and will be further detailed in deliverables D7.2 (M11), D7.3 (M23) and D7.4 (M35).

3.1 Identification of exploitable results

OCEAN will produce the following types of results:

- Elaboration of business strategies providing investment incentives to the different types of players in the content delivery value chain over Internet;
- Design of a new open content delivery architectural framework;
- Specification of innovative content popularity distribution estimation techniques and self-learning caching algorithms;
- Specification of new media-aware congestion control mechanisms;
- Proof-of-Concept Implementation through simulations, large-scale emulations and trial in a real ISP network to assess the validity and performance of these algorithms and mechanisms.

The following table details expected exploitable results of OCEAN to date. As the project progresses further, the list may change to include more details.

Result	Type	Deliverable(s)
Elaboration of business strategies providing investment incentives to the different types of players in the value chain	Specification / Design	D2.3, D2.4, D2.5
Design of a new open content delivery architectural framework	Design	D3.1, D3.2
Specification of innovative content popularity distribution estimation techniques and self-learning caching algorithms	Specification	D4.1, D4.2, D4.3, D4.4, D4.5, D4.6, D4.7
Specification of new media-aware congestion control mechanisms and distributed delivery methods	Specification	D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D5.7, D5.8, D5.9
Simulations, large-scale emulations and trial in a real ISP network to assess the validity and performance of these algorithms and mechanisms	Implementation / Proof of Concept	D6.4, D6.5, D6.9, D6.10, D6.11, D6.12

Table 9. Expected exploitable results of OCEAN project

3.2 Partner exploitation lines

At this initial stage of the project, the exploitation plans are still preliminary and at a high level. As previously mentioned, updated versions of the dissemination plan will be issued at predefined times. At these occasions the exploitation plans of the different project partners will be refined as well.

The OCEAN Consortium consists of a wide variety of partners, covering nearly the whole spectrum of players in the content delivery domain. As a consequence, each partner may have its own specific plans for later exploitation of the knowledge that is commonly developed within OCEAN. For this reason, the exploitation plans are hereafter developed per individual OCEAN Partner.

3.2.1 France Telecom (FT)

Orange Labs, as research arm of France Telecom (FT) group, will be involved in the technical and business activities of the OCEAN project as well as in the dissemination effort, so as to contribute to the widespread adoption by the content delivery market players of the results and recommendations from the OCEAN project, leveraging its strong participation in key standardization bodies, including IETF, Broadband Forum, Open IPTV Forum, ITU-T, ETSI.

Via its participation to the OCEAN project, FT expects to acquire exploitable knowledge in the following domains: Internet content delivery architectures for very large scale distribution over fixed networks, content popularity distribution estimation techniques, self-learning caching algorithms, media-aware congestion control mechanisms.

As regards the exploitable product/service domains, it is to be noted that the FT is both a content provider and a network service provider. As content provider FT is currently investigating the best options to deliver its content over the Internet. As a network provider FT is coming up against major issues in carrying Internet traffic to its end-users. This traffic is amazingly picking up mainly driven by the growing success of audiovisual applications over Internet. As end-user pricing are flat rate and IP transit prices are declining slowly both can not compensate this traffic growth. OCEAN shall provide a technical solution which will ease the pressure of this traffic, including the required open interfaces between edge caching and traditional caching systems, while improving the quality of experience for end-users. OCEAN will also define the corresponding sustainable business model and the recommendations to enforce it, so as to give incentive for all players in the value chain to implement this technical solution. FT intends to exploit both the business and technical outcomes from the OCEAN project to address the aforementioned issues.

3.2.2 Alcatel-Lucent

As a network equipment and solutions supplier, Alcatel-Lucent develops products, applications and services that enable telecom operator and service provider networks to handle the expected future traffic requirements, in a sustainable business environment. Innovation in products and concepts requires extensive knowhow, for which continuous high research efforts are required.

From the research activities in the OCEAN project, Alcatel-Lucent expects to obtain exploitable knowledge in the following domains:

- Concepts and algorithms that allow the integration of dynamic and optimized caching technology into operator and service provider networks in a cost-efficient and scalable way;

-
- Functions and mechanisms needed to build telco network-based Content Delivery networks capable of interworking with other CDNs, based on open interfaces;
 - Mechanisms allowing the use of the information available in the network to provide media-aware congestion control;
 - Impact of market trends and evolution of value networks on the strategies and requirements of operators and service providers.

This knowledge will be exploited for the following:

- Enhancement of the network products and services portfolio to enable distribution of high volumes of content to end users with the required QoE level;
- Contributions to standardization initiatives, to accelerate the deployment of cost-effective and open solutions for large scale content distribution by network operators and service providers.

3.2.3 IBBT

Exploitable knowledge will be created in following areas:

- Distributed network intensive applications;
- Multimedia content delivery.

Exploitation will be achieved by setting up of academic and industrial partnerships, with the knowledge built up as an asset.

3.2.4 IDATE

Exploitable knowledge will be created in the following areas:

- Business models for open network architectures;
- Vision on future trends and evolutions in content delivery market.

Exploitation will be done in the following ways:

- Enhanced market reports and seminars related to online video;
- Strengthening of IDATE competence position for video content markets and media delivery technologies.

3.2.5 N2Nsoft

The OCEAN project will generate exploitable knowledge in the following areas:

- Congestion control with dynamic video rate adaptation and its economical consequences;
- Cache strategy and its impact on network costs.

Exploitation is planned to be done in R&D out-sourcing in the fields of telecommunication/networking.

3.2.6 Université de Versailles (UVS)

Exploitable knowledge will be created in the following areas:

- Applying theoretical and analytical competences to the content delivery applications field;
- Exploration of new research areas for application in the labs.

Exploitation will be done in the following ways:

- Setting up of academic and industrial partnerships, with the knowledge built up as an asset;
- Extension of educational topics for MSc and PhD students.

3.2.7 Fraunhofer HHI

As a research institute in the fields of Mobile Broadband Communications, Photonic Networks, and Electronic Imaging for Multimedia, Fraunhofer HHI will be involved in the development of innovative algorithms for congestion control and media delivery.

Via its participation to the OCEAN project, Fraunhofer HHI expects to derive from OCEAN exploitable knowledge in the following domains:

- Adaptive HTTP streaming with SVC;
- Fine granular rate adaptation with SVC;
- SVC in caching algorithms.

Exploitation of this knowledge will be targeted as follows:

- Strengthen its position as international centre of excellence for video coding and processing technologies as well as for media delivery technologies;
- Contribution to relevant standardisation bodies.

3.2.8 Telecom Poland (TP)

Telecom Poland (TP) is a major service provider in Poland and as such is seeking means to deliver growing amounts of content to its end-users in the most efficient way and ensuring the highest quality standards possible. Participation in OCEAN Project is a way to gain knowledge and experience on content delivery architectures that could be implemented in future TP network. This will allow to further increase quality of services delivered by TP.

At the same time Telecom Poland is a CDN network operator and has experience and knowledge that can be shared among OCEAN Project participants to improve the output of OCEAN Project.

Exploitable knowledge will come from the detailed operational results of field trial on CDN test bed in TP network.

Exploitation will be achieved by using the results obtained from the CDN experimentation to improve overall TP network.

3.2.9 EBU

Exploitable knowledge will be created through an increased understanding of the trends in the networking and Internet content delivery industries.

Exploitation will be done by leveraging the strong influential position with standardization bodies to facilitate introduction of new standards beneficial for EBU members.

4. STANDARDISATION

This section presents OCEAN initial plans as regards standardisation. OCEAN has two objectives here: exploit the latest developments from the standardisation bodies that are relevant for OCEAN project, and contribute actively to standards to promote OCEAN's technical outcomes.

4.1 Standardisation Surveillance Group

For the first objective, a standardisation surveillance group has been set up inside the OCEAN consortium aiming at monitoring the most relevant bodies, including ETSI TISPAN, ETSI MCD, MPEG MMT, IETF AVT, IETF MMUSIC working groups, as well as ATIS, Broadband Forum, DVB and 3GPP.

Table 9 provides an overview of the targeted standardization bodies.

Body	WG	Topic	Comment / Link with OCEAN
3GPP	SA4	Audiovisual Streaming Technologies	3GPP SA WP4 deals with the specifications for speech, audio, video, and multimedia codecs, in both circuit-switched and packet-switched environments.
ATIS		Content Delivery systems Interconnection	ATIS IPTV Interoperability Forum (IIF) fosters interoperable standards for IPTV delivery.
Broadband Forum		Network architecture	
DVB	TM-IPI	Audiovisual Streaming Technologies	
ETSI	TISPAN	CDN interconnection	Both MCD and TISPAN study CDN interconnection. TISPAN specifies a CDN architecture and the interconnection of TISPAN compliant CDNs [ETSI05]. MCD works on interconnecting existing CDNs with non TISPAN CDNs.
	MCD & MCD CDN-I	CDN interconnection	
IETF	ALTO	Application Layer Traffic Optimisation	ALTO protocol enables CDNs to request information about the underlying network topology to optimize traffic distribution. [IETF18] [IETF19]
	AVT	Audio/Video Transport	AVT specifies several protocols (namely RTP and RTCP) for multimedia content delivery.
	CDNI	CDN Interconnection	OCEAN partners have been deeply involved in the CDNI initiative at IETF, which successfully led to the creation of this WG dedicated to CDN Interconnection standards
	DECADE	Content Storage/Caching	DECADE's purpose is to enable the storage of P2P content in the network.
	MMUSIC	Multiparty Multimedia Session Control	The main task of MMUSIC is to maintain and develop the specification of RTSP, a signalling protocol for media delivery.
	PCN	Congestion and Pre-Congestion notification	PCN develops mechanisms to protect the quality-of-service of established inelastic flows within a DiffServ domain when congestion is imminent or existing.

IRTF	SAM	Scalable adaptive multicast	SAM seeks to develop a scalable and adaptive multicast architecture, which is necessary for group communication or gaming via the Internet.
	P2P RG	Peer-to-Peer Research Group	P2P RG studies the new issues and questions related to P2P communications that arise and that do not enter in the scope of an existing IETF working group [IETF20].
ISMA		Audiovisual Streaming Technologies	The Internet Streaming media alliance is a group driving the definition of open standards for IPTV. It promotes the use of RTSP, RTP, and a subset of the MPEG-4 specification.
ITU-T		Content Delivery Architecture	ITU defines a hierarchical architecture of content delivery functions [ITU01], [Y.2019].
ISO/IEC		Scalable Video Coding (SVC)	The Joint Video Team of the ITU-T VCEG and the ISO/IEC MPEG has standardized a Scalable Video Coding (SVC) extension of the H.264/AVC standard.
MPEG	MMT	Audiovisual Streaming Technologies	
OIPF		Content Delivery Architecture	OIPF Release 2 will be completed in Q3 2010. It covers several services such as nPVR and content on demand in a managed scenario. OIPF bases on TISPAN CDN specifications.

Table 10. Overview of OCEAN Standardization Surveillance Group.

Table 11 presents the structure of the standardisation surveillance matrix, showing the correspondence between the aforementioned standardization bodies and the consortium partners.

<i>Body</i>	<i>WG</i>	<i>FT</i>	<i>A-LBEL L</i>	<i>IBBT</i>	<i>IDAT E</i>	<i>N2N</i>	<i>UVS</i>	<i>FRA UN HOF ER</i>	<i>TP</i>	<i>UERT</i>
Broadband Forum		X	X							
DVB		X						X		X
ETSI	TISPAN	X								
	MCD	X								X
IETF	ALTO	X	X							
	AVT									
	CDNI	X	X						X	
	MMUSIC	X						X		
	PCN									
IRTF	SAM									
	P2P RG									
ISMA										
ITU-T		X						X		
ISO/IEC										
MPEG	MMT		X					X		X
OIPF		X	X							X
ATIS		X								
3GPP	SA4	X	X					X		
W3C	-							X		

Table 11. Overview of OCEAN Standardisation Surveillance Matrix.

4.2 Candidate Standardisation Bodies for Active Contributions

Active contribution to standards is decisive for the success of the project. Indeed OCEAN will define an OPEN architectural framework for audiovisual content delivery over Internet. "OPEN" means that OCEAN will specify public interfaces between the major building blocks in multimedia content delivery architectures, outlining key responsibilities and roles. As the project aims to provide solutions that are applicable for multi-player environments, standardisation is an important issue to ensure that the proposed solutions can be actually deployed by different players using equipments from different vendors.

The standardization bodies listed in the following subsection 4.2.1 are potential candidates for this dissemination. Besides OCEAN partners have started to play an active role in the bodies most appropriate for the project dissemination. The corresponding contributions are listed in section 4.3.

4.2.1 ETSI

4.2.1.1 TISPAN

ETSI/TISPAN (European Telecommunications Standards Institute/ Telecoms & Internet converged Services & Protocols for Advanced Networks) has been mainly concentrating on IPTV architectures and is now expanding into CDN standardization. A new work item has been initiated last year to ensure interoperability and availability of CDN standards for IMS IPTV [ETSI05]. A Technical committee for content management, MCD (Media Content Distribution) [ETSI04] has been also created recently. ETSI/TISPAN will evolve its work plan to take more into account the specifics of contents swelling from the Internet.

OCEAN intends to contribute to the evolution of TISPAN CDN architecture to enable CDN interconnection if ETSI TISPAN really becomes the leading body for that topic, as it is foreseen today.

4.2.1.2 MCD

TC-Media Content Distribution (MCD) is the ETSI technical body in charge of guiding and coordinating standardization work aiming the successful overall development of multimedia systems (television and communication) responding to the present and future market requests on media content distribution.

In the scope of convergence of broadcast, internet and telecommunications standards in relation to digital media distribution, TC MCD will be in contact with other relevant bodies within and outside ETSI, and foster a modular and harmonized standardization environment aiming to coordinate efforts and prevent duplication of activities.

TC MCD is addressing the domain of interoperability of content distribution and the related services in a converged environment supporting IPTV, Mobile TV and broadcast TV.

OCEAN has been following the activities of MCD related to CDN interconnection and has been contributing when appropriate.

4.2.2 DVB

The DVB project (Digital Video Broadcasting) conducts several groups, including the TM-IPI (Internet Protocol Infrastructure) group. This group has developed a set of open, interoperable technical specifications called DVB -IPTV for the delivery of digital TV using Internet Protocol over bi-directional fixed broadband networks. While Track 1 of DVB-IPTV covers delivery over managed networks, Track 2 covers Open Internet Content Delivery.

OCEAN will follow the activities in DVB TM-IPI and contribute when appropriate.

4.2.3 3GPP

The 3rd Generation Partnership Project (3GPP) is a collaboration between groups of telecommunications associations, to make a globally applicable third-generation (3G) mobile phone system specification within the scope of the International Mobile Telecommunications-2000 project of the International Telecommunication Union (ITU). 3GPP specifications are based on evolved Global System for Mobile Communications (GSM) specifications. 3GPP standardization encompasses Radio, Core Network and Service architecture. 3GPP SA WP4 deals with the specifications for speech, audio, video, and multimedia codecs, in both circuit-switched and packet-switched environments.

OCEAN will follow the activities of 3GPP SA4 group on HTTP (adaptive) streaming.

4.2.4 MPEG

MPEG (ISO/IEC JTC1/SC20/WG11) (Moving Picture Experts Group) has been strongly involved in the standardization for audio and video codecs (e.g., MPEG-4 AVC/SVC/MVC) and for multimedia transport and file storage. Recent activities also highlight the interest of new IP transport mechanisms [MMT].

OCEAN will participate in this activity and contribute when appropriate. The project will follow the standardization activities in the Ad-Hoc Group (AHG) on HTTP Streaming of MPEG Media and AHG on MPEG Media Transport (MMT).

4.2.5 IETF

The IETF (Internet Engineering Task Force) has referenced in the early 2000's a set of RFCs describing the taxonomy for CDN applied to Web traffic [IETF02], [IETF04], [IETF05]. Efforts were also dedicated to define standards for interworking between CDNs [IETF01], [IETF03], [IETF07], [IETF08], [IETF09], [IETF10], [IETF11], [IETF12], [IETF13] [IETF14], [IETF15], [IETF16]. But these were not enforced due to the lack of business incentives. These efforts had to be revived to address the specifics of multimedia contents, with greater chances of adoption by market stakeholders as the context has become more favourable. By the way OCEAN partners have been deeply involved in the CDNI initiative at IETF this year, which successfully led to the creation of a Working Group dedicated to CDN Interconnection standards (IETF CDNI WG).

The IETF has also recently launched the ALTO Working Group [IETF18]. This working group aims at designing and specifying an Application-Layer Traffic Optimization (ALTO) service that will provide applications with information to perform better-than-random initial peer selection in distributed content delivery architectures. The ALTO WG has received high levels of attention by the research communities focusing on Peer-to-Peer systems. Still, as its charter confirms, this WG will not only consider the needs of BitTorrent tracker-less like P2P, but also other applications, such as content delivery networks (CDN) and mirror selection. OCEAN consortium will closely follow the on-going activities in this WG and contribute as appropriate.

The ALTO WG was initiated from the preliminary works achieved by DCIA (Distributed Computing Industry Association). DCIA is a US based non-profit trade organization focused on commercial development of file sharing and related distributed computing technologies. The DCIA conducts working groups and special projects, in particular the P4P Working Group, aimed at aligning "overlay"

(CDN, P2P) topologies with the underlying transport topology, so as to improve ISPs' transport resource utilisation and end-users perceived quality of experience [P4P01].

OCEAN will monitor activities in the IETF Real-time Applications and Infrastructure Area as AVT and MMUSIC and will contribute when appropriate.

4.2.6 Broadband Forum

The Broadband Forum is a non-profit global industry consortium dedicated to developing broadband network specifications. DSL-related specifications, while still a key part of the forum's work, are no longer its only work. For instance, the Forum has produced work specific to Passive Optical Networks (PON) and has expanded its scope towards middleware and applicative technologies, including Network Attached Storage (NAS). The Broadband Forum is intended to become an essential body for the standardization of caching technologies over access networks.

OCEAN will follow the activities in the Broadband Forum and contribute when appropriate.

4.2.7 ITU-T

ITU-T (International Telecommunication Union- Telecommunication standardization sector) has achieved relatively limited activities regarding distributed architectures for online multimedia delivery. Some light functional content delivery architectures have been captured in Recommendation Y.1910 ("IPTV functional architecture") [ITU-T01]. But ITU-T has been strongly involved in the specification of video standards (H.26x series) and, as usual, is meant to have the pivotal role in architectural standards.

OCEAN will monitor the activities at the ITU-T.

4.2.8 Open IPTV Forum (OIPF)

The Open IPTV Forum (OIPF) has been created in 2007 by the largest telecom manufacturers and operators. OIPF intends to produce end-to-end specifications for content delivery architectures and handle IOT/Certification Program. This group is more focused on the home network and content delivery network aspects. Two network architecture models are covered: managed model (with guaranteed QoS), in which provider network aspects are aligned with ETSI/TISPAN achievements, and unmanaged model (without strict guaranteed QoS). The Open IPTV Forum defines a hierarchical CDN where the "last segment" is a legacy RTSP server.

OCEAN arrives at the right moment to influence on these activities. The OCEAN members are and will stay in close contact with this working group.

4.2.9 Internet Streaming Media Alliance (ISMA)

Internet Streaming Media Alliance (ISMA) was founded in 2000 by several companies to accelerate the market adoption of open standards for streaming and progressive download of rich media over all types of Internet Protocols (IP). The ISMA is a diverse alliance with representatives from all points of the streaming work-flow. While standards already exist for audio and video codecs (e.g. MPEG) and for real time streaming transport over IP networks (e.g. RTP) putting these together requires selecting profiles, describing payload formats, and resolving various options. ISMA specifications

typically adopt existing specifications in order to form a complete solution. The ISMA also performs interoperability testing, allowing its members to ensure that their products conform to ISMA standards and interoperate.

ISMA is not in working stage at the moment. OCEAN could submit technical proposals to this body when appropriate.

4.2.10 W3C

The World Wide Web Consortium (W3C) is the main international standards organization for the World Wide Web (abbreviated WWW or W3). W3C is interesting to OCEAN project due to its activities around HTML5 which also includes video delivery.

OCEAN will monitor activities in the HTML5 activities in W3C and will contribute if appropriate.

4.3 Active contributions to Standardisation

OCEAN contributed to the works of several standardisation bodies. In the following these contributions are listed sorted by the targeted standardisation body.

4.3.1 3GPP

3GPP SA4#59, TDoc S4-100519, "Use cases for IVCS release 10 - SVC for HTTP adaptive streaming", Fraunhofer Gesellschaft, June, 21th-25th, 2010.

3GPP SA4#61, TDoc S4-100826, "Caching efficiency improvement with SVC for HTTP-based video on demand," Fraunhofer Gesellschaft, 8-12 November, Barcelona, 2010.

3GPP SA4#62, TDoc S4-110022, "Caching efficiency improvement with SVC for chunk based HTTP video on demand", , " Fraunhofer Gesellschaft, 10-14 January, 2011, Berlin, Germany.

3GPP SA4#62, TDoc S4-110150 "Caching efficiency improvement with SVC for chunk based HTTP video on demand", Fraunhofer Gesellschaft and France Telecom, 10-14 January, 2011, Berlin, Germany.

4.3.2 MPEG

T. Schierl, Y. Sanchez, K. Grüneberg, "On Adaptive HTTP Streaming using SVC and MVC," Response to CfP on HTTP Streaming of MPEG Media, MPEG#93, Geneva, 26-30 July 2010.

HHI presented a demonstration of a streaming system on DASH using SVC at the MPEG#96 meeting in Geneva 11/03/21-25. The related presentation can be found at ftp://ext-ocean@huitrier.rd.francetelecom.com/incoming/WP7/Standardisation/MPEG_DASH/SVC-DASH.pdf.

An initial version of the OCEAN SVC streaming client was presented.

4.3.3 IETF

Emile Stéphan and Gilles Bertrand (FT) took an active role in the preparation of the CDNI BoF during IETF #80 end of March 2011, which was decisive for the launch of the CDNI WG (CDN Interconnection Working Group).

Following the BoF on CDNI held during IETF 80th (31 March, Prague, Czech Republic) IETF representatives announced on June 23 that CDNI was officially approved as Working Group. OCEAN

partners contributed to this success through the production of CDNI initiative's drafts, participation to the IETF meetings and discussion on CDNI mailing list.

- Contribution to IETF draft "Content Distribution Network Interconnection (CDNI) Problem Statement" (<http://tools.ietf.org/search/draft-jenkins-cdni-problem-statement-02>). It is to be noted that one section in the body of the draft is dedicated to OCEAN and that OCEAN consortium is mentioned in the acknowledgement section.
- Gilles Bertrand (FT) co-authored the first two versions of the IETF draft "Content Distribution Network Interconnection (CDNI) Experiments" (<http://tools.ietf.org/html/draft-bertrand-cdni-experiments-01>)
- Marcin Pilarski (TP) co-authored and published on April 19, 2011, the first version of the IETF draft "A simple approach for CDN interconnection" (<http://tools.ietf.org/html/draft-peterson-cdni-strawman-00>).
- Edition of the IETF draft « Technical Use Cases for Content Distribution Network Interconnection (CDNI) » (<http://tools.ietf.org/html/draft-bertrand-cdni-use-cases-02>), now adopted as a Working Group draft.
- « Catalogue of Advanced Use Cases for Content Delivery Network Interconnection », draft-fmn-cdni-advanced-use-cases-00. October 24, 2011 (<http://tools.ietf.org/id/draft-fmn-cdni-advanced-use-cases-00.txt>)

Draft co-authored by OCEAN and other European projects from EC FMN cluster (Abstract: The purpose of this draft is to complement the current CDNI WG use cases with a catalogue of advanced, longer-term CDN interconnection use cases. The work has been the contribution of six European Commission (EC) co-funded projects, which are part of the EC Future Media networks (FMN) cluster).

- "Metadata for CDNs Interconnection", draft-stephan-cdni-usecases-metadata-00. October 24, 2011 (<http://tools.ietf.org/html/draft-stephan-cdni-usecases-metadata-00>)

Draft edited par Emile Stephan (FT) (Abstract: There are use cases where the delivery of contents by a CDN on the behalf of another requires the exchange of extra information between these CDNs. This memo proposes a RESTful framework for the exchange of content distribution metadata between an upstream and a downstream CDN. Then it applies this framework to the use cases selected by the CDNI WG [I-D.ietf-cdni-use-cases] to identify relevant operations, objects and information elements of the CDNI metadata interface and to verify that the RESTful approach suits for these operations.)

4.3.4 TISPAN

France Télécom (Rémi Pages, Gilles Bertrand) authored and contributed to the following contributions for ETSI meetings TISPAN#26WGs and MCD CDN-I#1 (March 2011):

- MCD CDN-I(11)0010r2 TS102990 Adding IETF use cases (France Telecom)
- TISPAN03(11)0005 WI3218 reference point correction (France Telecom)
- TISPAN03(11)0006r2 WI3218 RTSP Session termination (France Telecom)
- TISPAN03(11)0007r3 WI3218 Session initiation (France Telecom)

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- TISPAN02(11)0009r2 CDN-I coordination TISPAN-MCD-IETF (TNO, KPN N.V., France Telecom)
 - TISPAN02(11)0013 WI2076 Annex E references (France Telecom)
 - TISPAN02(11)0014r1 WI2076 Cf use case (France Telecom)
 - TISPAN02(11)0015 WI2076 Correcting references 7.2.2 (France Telecom)
 - TISPAN02(11)0016 WI02076 Correcting references 7.2.1.2 (France Telecom)
 - TISPAN02(11)0017r1 WI2076 Restricted trick play (France Telecom)

4.3.5 W3C

Contribution to Third W3C Web and TV Workshop “Scalable Video Coding based DASH for efficient usage of network resources”, FRAUNHOFER, ALU, FT, .

Paper: http://www.w3.org/2011/09/webtv/papers/Sanchez_et_al_W3C.pdf

Slides: http://www.w3.org/2011/09/webtv/slides/w3c_presentation_v4.pdf



5. CONCLUSION

Deliverable D7.3 is the second dissemination report of the OCEAN project. It updates the first dissemination report D7.2.

Deliverable D7.3 presents the project dissemination strategy, including the dissemination target audience groups, the actions and channels to reach these groups during the project life, and the first opportunities for external collaborations. Then it provides a preliminary identification of the expected results exploitable by the consortium partners, and finally the project's initial approach concerning the possible use of and contributions to standards.

A preliminary version of the dissemination plan was presented in deliverable D7.1 at Month M7 and the first dissemination plan in D7.2 in Month M11. The final dissemination plan will be presented in D7.4 (Final Dissemination Report, including updated version of Dissemination Plan) at Month M35.

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ACRONYMS

3GPP	3rd Generation Partnership Project
ADSL	Asymmetric Digital Subscriber Line
AHG	Ad-Hoc Group
AL-BELL	Alcatel-Lucent Bell
ALTO	Application-Layer Traffic Optimization
ATIS	Alliance for Telecommunications Industry Solutions
AVC	Advanced Video Coding
AVT	Audio/Video Transport
CDI	Content Delivery Internetworking
CDN	Content Delivery Network
COAST	COntent Aware Searching, retrieval and sTreaming
DECADE	Decoupled Application Data Enroute
DCIA	Distributed Computing Industry Association
DSLAM	Digital Subscriber Line Access Multiplexer
DVB	Digital Video Broadcasting
EC	European Commission
ENVISION	Enriched Network-aware Video Services over Internet Overlay Networks
EC	European Commission
ETSI	European Telecommunications Standards Institute
FIA	Future Internet Assembly
FCN	Future Content-Centric Network
FMN	Future Media Networks
FP7	Framework Programme 7
FT	France Télécom
FTTH	Fiber To The Home
GE	Gigabit Ethernet
HD	High Definition
HTTP	Hypertext Transfer Protocol
IBBT	Interdisciplinary Institute for Broadband Technology
ICT	Information and Communication Technologies
IDATE	Institut De l'Audiovisuel et des Télécommunications en Europe

IETF	Internet Engineering Task Force
IRTF	Internet Research Task Force
IP	Internet Protocol
ISMA	Internet Streaming Media Alliance
ISO/IEC	International Organization for Standardization/ International Electrotechnical Commission
ISP	Internet Service Provider
ITU-T	International Telecommunication Union- Telecommunication standard
MCD	Media Content Distribution
MMUSIC	Multiparty Multimedia Session Control
MMT	Multi-Media Transport over IP-Based Networks
MPEG	Moving Picture Experts Group
MsC	Master of Science
MVC	Multiview Video Coding
NEM	Networked and Electronic Media
OCEAN	Open ContEnt Aware Networks
OIPF	Open IPTV Forum
PCN	Pre-Congestion Notification
PhD	Doctor of Philosophy
P2P	Peer-to-peer
QoE	Quality of Experience
QoS	Quality of Service
RTP	Real Time Transport Protocol
RTSP	Real Time Streaming Protocol [IETF06]
SAM	Scalable adaptive multicast
SLA	Service Level Agreement
SVC	Scalable Video Coding
TELCO	Telecom Operator
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TM-IPI	Technical Module - IP Infrastructure
TP	Telecom Polska
UERT	European Broadcasting Union (EBU)



UVS	Université de Versailles – Saint Quentin en Yvelines
VoD	Video on Demand
WP	Work Package