



Broadcast and Multicast Communication Enablers for the
Fifth-Generation of Wireless Systems

5G-Xcast_D7.3

Dissemination Report

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Abstract

This document summarizes the dissemination activity of the 5G-Xcast project during the first year (from 01/06/2017 to 31/05/2018). The activities of partners related to deliverables, journal and conference papers are listed with a download links. The dissemination events such keynote talks and presentations are listed with the number of people reached. 5G-Xcast has also organised workshops and tutorials that are listed. Finally, social media activity, public website and videos produced by the partners are discussed.

Keywords

5G-PPP Phase 2, dissemination, IEEE conference, workshop, twitter, public website, YouTube video. Keynote speech, tutorial.

¹ CO = Confidential, only members of the consortium (including the Commission Services)

PU = Public

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List of Acronyms and Abbreviations

BMSB	International Symposium on Broadband Multimedia Systems and Broadcasting
CO	Confidential Deliverable
IBC	International Broadcasting Convention
IEEE	Institute of Electrical and Electronics Engineers
PU	Public Deliverable
SFN	Single Frequency Network
3GPP	3rd Generation Partnership Project
5G-PPP	5G Public-Private Partnership

1 Introduction

This deliverable summarises the dissemination activities related to 5G-Xcast performed during the project, e.g. journal and conference papers, keynotes and presentations, workshops or tutorials. In order to ensure open access, and for a maximum diffusion of project results, submitted version of IEEE conference papers and journals have been posted on the project website as per IEEE policy [1]. Author' versions of these papers have been also published in Research Gate and public platforms available in academia, e.g. RiuNet (UPV repository).

A table summarizing the targets of the project for different dissemination and communication activities, as well as the objectives reached so far, is given below.

Table 1: Project targets and current number of dissemination activities.

Dissemination activity	Current number	Target
International journals, whitepapers and conference papers	17	40
Keynotes and panels in major conferences	13	10
Participation in 5G/Broadcast events and forums	11	10
Workshops in major IEEE conferences	5	8
Summer schools, tutorials and training	1	4
Public deliverables	16	21

These dissemination activities have helped to reach a large number of people from academia, industry, civil society, media, etc. In particular, 1822 people from the scientific community, 63738 people from the industry, 44 people from the civil society, 510 people from the general public, 141 policy makers, 158 people from media, 492 customers and 1142 people from others sectors. In total, 67926 people have been reached with the 5G-Xcast dissemination activities.

2 Deliverables

During the project, confidential and public open deliverables have been developed. Deliverables are related to specific tasks and work packages. All documents have been either published in the project website or shared with 5G-PPP projects for inter-project cooperation.

Please note that CO stands for confidential, PU for public and first versions of public deliverables as stated in the proposal are not available in the website. For deliverables with more than one version, first and final release will have names v1.X and v2.X respectively.

Work Package 1:

- D1.1 I. Alepuz, Ed., "Project Management and Administration Guidelines,"
(CO) Deliverable 1.1, 5G-PPP 5G-Xcast project, June 2017.
- v1.0: available both in the website and internal repository.
 - v1.1: editorial changes, only internal repository.
- D1.2 I. Alepuz and D. Gomez-Barquero, Eds., "Mid-Term Management and
(CO) Administration Activities", Deliverable 1.2, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: only available in the internal repository.

Work Package 2:

- D2.1 D. Ratkaj and A. Murphy, Eds., "Definition of Use Cases, Requirements
(PU) and KPIs," Deliverable 2.1, 5G-PPP 5G-Xcast project, Oct. 2017.
- v1.0: available both in the website and internal repository.
- D2.2 A. Murphy, C. Kunert and I. Alepuz, Eds., "Analysis of the Technical
(PU) Developments Against the Use Cases", Deliverable 2.2, 5G-PPP 5G-Xcast project, Apr. 2018
- v1.2: first version, only available in the internal repository.

Work Package 3:

- D3.1 D. Vargas and D. Mi, Eds., "LTE-Advanced Pro Broadcast Radio Access
(PU) Network Benchmark," Deliverable D3.1, 5G-PPP 5G-Xcast project, Nov. 2017.
- v1.1: editorial changes, available in website and internal repository.
- D3.2 E. Garro, J. J. Gimenez and M. Fuentes, Eds., "Air Interface", Deliverable
(PU) 3.2, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository.

Work Package 4:

- D4.1 T. Tran, Ed., "Mobile Core Network," Deliverable 4.1, 5G-PPP 5G-Xcast
(PU) project, May 2018.
- v1.0: available both in the website and internal repository.
- D4.2 J. Hart, Ed., "Converged Core Network," Deliverable 4.2, 5G-PPP 5G-

-
- (PU) Xcast projects, Feb. 2018.
- v1.0: first version, only available in the internal repository.
- D4.3 B. Altman, Ed., “Session Control and Management,” Deliverable 4.3, 5G-
(PU) PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository.

Work Package 5:

- D5.1 N. Nouvel, Ed., “Content Delivery Vision,” Deliverable 5.1, 5G-PPP 5G-
(PU) Xcast project, Nov. 2017.
- v1.1: editorial changes, available in website and internal repository.
- D5.2 T. Stevens, Ed., “Key Technologies for the Content Distribution Network”,
(PU) Deliverable 5.2, 5G-PPP 5G-Xcast project, Feb. 2018.
- v1.0: first version, only available in the internal repository.
- D5.3 B. Altman, Ed., “Application Layer Intelligence”, Deliverable 5.3, 5G-PPP
(PU) 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository.

Work Package 6:

- D6.1 T. Jokela, J. Morgade, K. Dushchuluun, Eds., “Initial Planning for Test-
(CO) Beds, Showcase and Demonstrators,” Deliverable 6.1, 5G-PPP 5G-Xcast
project, May 2018.
- v1.0: only available in the internal repository.
- D6.2 A. Murphy and J. J. Gimenez, Ed., “Development of Showcase and
(PU) Demonstrators”, Deliverable 6.2, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository.
- D6.3 D. Mi and J. J. Gimenez, Ed., “Test-Beds Integration and Development”,
(PU) Deliverable 6.3, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository

Work Package 7:

- D7.1 B. Mouhouche, Ed., “Data Management Plan,” Deliverable 7.1, 5G-PPP
(PU) 5G-Xcast project, Aug 2017 (First version).
- v1.0: first version, only available in the internal repository.
- D7.2 B. Mouhouche, Ed., “5G-PPP Collaboration, Dissemination and
(CO) Exploitation Plan,” Deliverable 7.2, 5G-PPP 5G-Xcast project, Nov 2017.
- v1.0: only available in the internal repository.
- D7.3 B. Mouhouche and M. Fuentes, Eds., “Dissemination Report,” Deliverable
(PU) 7.3, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository

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- D7.4 (PU) B. Mouhouche and M. Fuentes, Eds., “Exploitation and Standardisation Report,” Deliverable 7.4, 5G-PPP 5G-Xcast project, May 2018.
- v1.0: first version, only available in the internal repository

3 Journal Articles and Magazines

The main results of 5G-Xcast in the first phase of the project have been published in 2 journal papers and 1 informative magazine. The full text can be found in (<http://5g-xcast.eu/documents/>).

3.1 Journal Articles

The following journal papers have been **published** up to now:

1. J. J. Gimenez, D. Gomez-Barquero, J. Morgade, and E. Stare, "Wideband Broadcasting: A Power-Efficient Approach to 5G Broadcasting," *IEEE Communications Magazine*, vol. 56, no. 3, pp. 119 – 125, Mar. 2018.
2. D. Gomez-Barquero, D. Navratil, S. Appleby, and M. Stagg, "Point-to-Multipoint Communication Enablers for the Fifth-Generation of Wireless Systems," *IEEE Communications Standards Magazine*, vol. 2, no. 1, pp. 53-59, Mar. 2018.

3.2 Informative Magazines

5G-Xcast has produced one informative magazine article:

1. D. Ratkaj, "EU-funded research in 5G broadcast – 5G-Xcast," *The EBU magazine Tech-I*, vol. 33, p. 33, Sep. 2017.

4 Conference Papers

5G-Xcast partners have published many papers that can be found in (<http://5g-xcast.eu/documents/>). The following conference papers have been **published** or **accepted**:

1. J. L. Carcel, J. Gimenez and D. Gomez-Barquero, "Zero-Guard OFDM Operation in SFN with ATSC 3.0 Ultra-Robust Transmission Modes," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Cagliari, Italy, 2017.
2. J. Kalliovaara, *et al.*, "Designing a Testbed Infrastructure for Experimental Validation and Trialing of 5G Vertical Applications," *Proc. EAI International Conference on Cognitive Radio Oriented Wireless Networks (CROWNCOM)*, Lisbon, Portugal, 2017.
3. B. Mouhouche, L. Christodoulou and M. Fuentes, "Partial HARQ Retransmission for Broadcast in Fading Channels," *Proc. International Conference on Computer Science, Information Technology and Applications (CSITA)*, Dubai, UAE, 2017.
4. A. Prasad, M. A. Uusitalo, D. Navrátil, and M. Säily, "Challenges for Enabling Virtual Reality Broadcast Using 5G Small Cell Network," *Proc. IEEE Wireless Communications and Networking Conference (WCNC)*, Barcelona, Spain, 2018.
5. W. Guo, M. Fuentes, L. Christodoulou and B. Mouhouche, "Roads to Multimedia Broadcast Multicast Services in 5G New Radio," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
6. M. Fuentes, L. Christodoulou and B. Mouhouche, "Non-Uniform Constellations for Broadcast and Multicast in 5G New Radio," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
7. A. Prasad, P. Lunden, Z. Li and M. Uusitalo, "Enhancements for Enabling Point-to-Multipoint Communication Using Unlicensed Spectrum," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
8. T. Jokela, *et al.*, "Trials of Spectrum Sharing in 2.3 GHz band for two types of PMSE Equipment and Mobile Network," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
9. J. Gimenez, S. Elliot, D. Vargas, P. Renka and D. Gomez-Barquero, "Coverage Evaluation of LTE feMBMS for Large Area Broadcasting," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
10. N. Bhat H.M and W. Zia, "Optimization of Tune-in and End-to-end Delay in DASH Broadcast over ROUTE," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.

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11. E. Öztürk, W. Zia, V. Pauli and E. Steinbach, "Performance Evaluation of ATSC 3.0 DASH over LTE eMBMS," *Proc. IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018.
 12. A. Zafeiropoulos, *et al.*, "Enabling Vertical Industries Adoption of 5G Technologies: a Cartography of evolving solutions," *Proc. European Conference on Networks and Communications (EUCNC)*, Ljubljana, Slovenia, 2018.
 13. A. Prasad, A. Maederz, and M. A. Uusitalo, "Optimizing Over-The-Air Virtual Reality Broadcast Transmissions with Low-Latency Feedback," *Proc. IEEE 5G World Forum*, Santa Clara, USA, 2018.
 14. H. Chen, D. Mi, Z. Chu, P. Xiao and R. Tafazolli, "Rate-Splitting for Multigroup Multicast Beamforming in Multicarrier Systems," *IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Kalamata, Greece, 2018.
 15. H. Chen, *et al.*, "Pioneering Studies on LTE eMBMS: Towards 5G Point-to-Multipoint Transmissions," *IEEE Sensor Array and Multichannel Signal Processing (SAM) Workshop*, Sheffield, UK, 2018.

5 Keynote Talks, Presentations and Posters

The main results of 5G-Xcast in the first phase of the project have been presented in 27 talks and presentations:

	People reached
1. D. Gomez-Barquero, "Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems," <i>IEEE BMSB</i> , Cagliari, Italy, June 2017.	135
2. D. Gomez-Barquero, A. Prasad and B. Mouhouche, "Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems," <i>EUCNC</i> , Oulu, Finland, June 2017.	250
3. L. Christodoulou, "5G-Xcast, Developing Broadcast and Multicast Capabilities for the 5G," <i>IEEE 5G Summit</i> , Thessaloniki, Greece, July 2017.	122
4. D. Gomez-Barquero, "5G-Xcast", FOBTv, Amsterdam, Netherlands, Sep. 2017.	25
5. M. A. Uusitalo, "Wireless for Verticals", <i>IEEE 5G-IoT Summit</i> , Helsinki, Finland, Sep. 2017.	70
6. B. Mouhouche, "The Challenge of Broadcast Support in 5G Systems," <i>IEEE 5G Summit</i> , Montreal, Canada, Oct. 2017.	200
7. B. Mouhouche, "Role of Unlicensed Spectrum in Next Generation Wireless Systems," <i>IEEE PIMRC</i> , Montreal, Canada, Oct. 2017.	60
8. D. Vargas, "Broadcast and Multicast Communication Enablers for 5G," <i>DTG Spectrum Access Forum</i> , London, UK, Oct. 2017.	14
9. D. Mi, "Xcast Enabler for 5G," <i>5GIC Standards Sub-Group Meeting</i> , Guildford, UK, Nov. 2017.	20
10. S. Appleby, T. Stevens and R. Turnbull, "Unified Content Delivery on Fixed and Mobile Networks: A view of synchronous TV delivery," <i>EBU Forecast</i> , Geneva, Switzerland, Nov. 2017.	116
11. D. Gomez-Barquero, "All you want to know about the 5G-Xcast project," <i>EBU Forecast</i> , Geneva, Switzerland, Nov. 2017.	116
12. D. Gomez-Barquero, "The Disruption of 5G in Broadcasting," <i>BES Expo</i> , New Delhi, India, Feb. 2018.	240
13. D. Gomez-Barquero, "Broadcast in 5G," <i>BES Expo</i> , New Delhi, India, Feb. 2018.	240
14. M. Fuentes, "The Role of Broadcast in 5G New Radio and Beyond," <i>IEEE 5G Summit</i> , Trento, Italy, Mar. 2018.	60

15.	R. Turnbull, "Unified Content Delivery on Fixed and Mobile Networks: A view of synchronous TV delivery," <i>Advanced Spectral Management in 5G+ Networks</i> , London, UK, Mar. 2018.	54
16.	A. Prasad, "5G-Xcast: Enabling Mass Media Delivery & Interconnected Social Experiences in the 5G Era," <i>WIVE Project Seminar</i> , Helsinki, Finland, Mar. 2018.	30
17.	A. Prasad, "5G – A Key Enabler for New Verticals and Markets," <i>NAB Show</i> , Las Vegas, USA, Apr. 2018.	60
18.	R. Tafazolli, "5G, Any Service Any Cast, a Special Generation," <i>IEEE WCNC</i> , Barcelona, Spain, Apr. 2018.	30
19.	E. Guttman, "5G in 3GPP," <i>IEEE WCNC</i> , Barcelona, Spain, Apr. 2018.	30
20.	B. Mouhouche, "5G-Xcast Project, Scope and Objectives," <i>IEEE WCNC</i> , Barcelona, Spain, Apr. 2018.	30
21.	A. Prasad, "Role of Edge Computing in the Mass Delivery of Interconnected Social Experiences in 5G," <i>IEEE WCNC</i> , Barcelona, Spain, Apr. 2018.	30
22.	D. Gomez-Barquero, "Broadcast and Multicast Communications Enablers for 5G," <i>IEEE BTS Young Professionals Workshop</i> , Reggio Calabria, Italy, Apr. 2018.	125
23.	Narcis Cardona, "5G-Xcast", <i>5G Forum</i> , Málaga, Spain, Apr. 2018.	150
24.	A. Prasad, "5G-Xcast", <i>WBU IMCG</i> , Atlanta, USA, Apr. 2018.	95
25.	David Gomez-Barquero, "Broadcast and Multicast Communications Enablers for 5G", <i>5G Virtual Conference</i> , May 2018.	384
26.	B. Mouhouche, "Research and Standard Trends in Broadcast for Future 5G Cellular Systems", <i>5G Summit</i> , Hammamet, Tunisia, May 2018.	40
27.	B. Mouhouche, "5G Broadcast Use Cases and their Impact on Society and Citizens", <i>5G Summit</i> , Brasilia, Brazil, May 2018.	100
28.	A. Prasad, "5G context and the 5G-Xcast project", <i>World Broadcasting Union-Internet Media Connectivity Group (WBU-IMCG)</i> , Atlanta, USA, May 2018	90
29.	Darko Ratkaj, "Future distribution of public service media content and services", <i>EUCNC 2018 "Verticals Industries and Services for 5G" workshop</i> , Ljubljana, Slovenia, June 2018.	TBD
30.	D. Gomez-Barquero, "5G-Xcast for Public Warning Systems", <i>EUCNC 2018 "Verticals Industries and Services for 5G" workshop</i> , Ljubljana, Slovenia, June 2018.	TBD

The project has also prepared and presented 3 posters:

1. D. Gomez-Barquero, A. Prasad and B. Mouhouche, "5G-Xcast: Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems," *EUCNC*, Oulu, Finland, June 2017.
2. N. Nouvel, "5G-Xcast Mobile World Congress poster," Mobile World Congress 2018, *Barcelona*, Spain, Feb. 2018.
3. N. Nouvel, "Broadcast and Multicast Communication Enablers for the Fifth - Generation of Wireless Systems (5G-Xcast)," *NAB Show*, Las Vegas, USA, Apr. 2018.

6 Workshops

5G-Xcast has implemented a comprehensive dissemination strategy towards the scientific community with the organisation of workshops. This dissemination strategy is of prime importance to let project's results and findings percolate among academic and industrial research peers and the regulatory community.

The following workshops have been organized so far:

1. Joint Workshop with Speed5G, "Advanced spectrum management in 5G+ networks", *Speed5G Workshop*, London, UK, Mar. 2018.
2. Joint Workshop with ONE5G, "Centimetre and Millimetre Wave based communications for 5G Networks (CmMmW5G)," *IEEE WCNC 2018*, Barcelona, Spain, Apr. 2018.
3. 5G-Xcast Workshop, "Point-to-Multipoint as Key Technology Element for 5G Systems," *IEEE BMSB 2018*, Valencia, Spain, June 2018.
4. Joint Workshop with 5G-PPP Projects, "Delivering Future Media Applications and Services in 5G," *EUCNC Conference*, Ljubljana, Slovenia, June 2018.
5. Joint Workshop with University of Oulu, "Disrupting Media and Entertainment in the 5G Era" *IEEE 5G World Forum*, Santa Clara, USA, July 2018.
6. Joint Workshop with ONE5G, "5G Advanced: The Next Evolution Step of 5G NR," *IEEE Globecom 2018*, Abu Dhabi, UAE, Dec. 2018.

7 Tutorials and Training Schools

1. A one-day tutorial on 5G-Xcast will be held on Tuesday 5th June 2018, [“Tutorial 5G-Xcast”, IEEE BMSB 2018, Valencia, Spain, June 2018.](#)

The tutorial is addressed to academia and industry players interested in future 5G networks and broadcast media distribution. Students interested in careers wireless and broadcast communications are also welcome to attend the tutorial. The tutorial program is given below:

Time	Topic	Duration
09:00 – 10:40	Welcome and introduction (Context: 5G-PPP, H2020, IMT-2020)	25 min
	5G Overview	25 min
	The challenge of PTM delivery in 5G: Introduction to 5G-Xcast	25 min
	5G-Xcast Use Cases	25 min
10:40 – 11:10	COFFEE BREAK	
11:10 – 12:50	4G LTE-A+ RAN Overview	50 min
	5G New Radio Rel'15 Overview	
	5G-Xcast RAN	50 min
12:50 – 14:10	LUNCH BREAK	
14:10 – 15:50	4G LTE-A+ Core Network Overview	30 min
	5G Core Network Rel'15 Overview	
	5G-Xcast Converged Core Network	40 min
	Content Distribution Framework SoA	30 min
15:50 – 16:20	COFFEE BREAK	
16:20 – 18:00	5G-Xcast Content Distribution Framework	30 min
	5G-Xcast Test-beds and Demonstrations	45 min
	5G-Xcast Dissemination	10 min
	5G-Xcast Future Work and Next Steps	15 min

8 Booth at EUCNC 2018

5G-Xcast partners Turku University of Applied Science and Fairspectrum will be holding a booth at the EUCNC 2018 conference where they will present a demonstration on dynamic spectrum use.

5G-XCast provides means to deliver the new audio-visual media, like 4k/8k Ultra-High-Definition Television and Virtual Reality including their consumer interactivity. As a part of media production, wireless links are used between the camera and the Outdoor Broadcasting van or another type of video processing unit.

The new audio-visual content requires higher bitrates and more spectrum from the wireless links than the High Definition (HD) video. At the same time, conventional PMSE (Programme making and special events) link bands get other spectrum users. PMSE differs from many other types of spectrum use as being local and having short time duration.

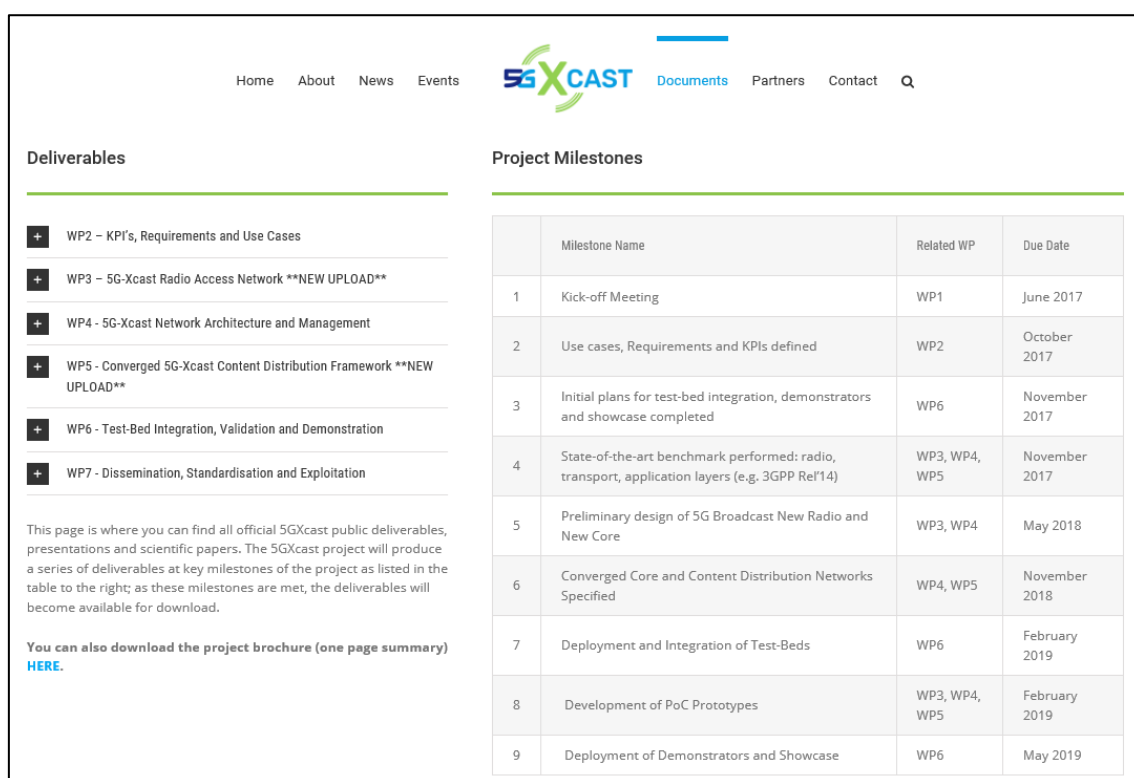
Solutions on how PMSE spectrum use can continue in the current form and how PMSE stakeholders can take the advantage of 5G will be demonstrated.

9 Project Website and Social Media

In order to ensure the largest possible exposure of the project, different social media and networking tools have been used. The main dissemination activities have been shared via the project website and twitter.

9.1 Project Website

A public website presents the news, events, description, consortium and public deliverables of the project. The public website is the central hub for the dissemination activities. Open access to scientific publications is being ensured by publishing submitted papers in compliance with IEEE rules. Figure 1 shows as an example part of the documents section, where public deliverables are shared.



The screenshot shows the 5G-Xcast project website. The navigation menu includes Home, About, News, Events, Documents, Partners, and Contact. The main content is divided into two sections: Deliverables and Project Milestones.

Deliverables:

- WP2 - KPI's, Requirements and Use Cases
- WP3 - 5G-Xcast Radio Access Network ****NEW UPLOAD****
- WP4 - 5G-Xcast Network Architecture and Management
- WP5 - Converged 5G-Xcast Content Distribution Framework ****NEW UPLOAD****
- WP6 - Test-Bed Integration, Validation and Demonstration
- WP7 - Dissemination, Standardisation and Exploitation

Project Milestones:

	Milestone Name	Related WP	Due Date
1	Kick-off Meeting	WP1	June 2017
2	Use cases, Requirements and KPIs defined	WP2	October 2017
3	Initial plans for test-bed integration, demonstrators and showcase completed	WP6	November 2017
4	State-of-the-art benchmark performed: radio, transport, application layers (e.g. 3GPP Rel14)	WP3, WP4, WP5	November 2017
5	Preliminary design of 5G Broadcast New Radio and New Core	WP3, WP4	May 2018
6	Converged Core and Content Distribution Networks Specified	WP4, WP5	November 2018
7	Deployment and Integration of Test-Beds	WP6	February 2019
8	Development of PoC Prototypes	WP3, WP4, WP5	February 2019
9	Deployment of Demonstrators and Showcase	WP6	May 2019

The Deliverables section also includes a note: "This page is where you can find all official 5Gxcast public deliverables, presentations and scientific papers. The 5Gxcast project will produce a series of deliverables at key milestones of the project as listed in the table to the right; as these milestones are met, the deliverables will become available for download." and a link: "You can also download the project brochure (one page summary) [HERE](#)."

Figure 1. 5G-Xcast project website.

9.2 Twitter

The project is using twitter as a key tool for dissemination. Not only news related to the project or published in the website, but also the main activities related to 5G-PPP or 3GPP are continuously shared through this platform.

Currently, the project has shared 65 tweets, and has 209 followers and 23 likes. The current number of tweets, followers and links on twitter are also observed in Figure 2.



Figure 2. 5G-Xcast twitter profile.

9.3 YouTube

A YouTube channel has been created to capture presentations from e.g. industry forum demonstrations, workshops, and test-bed trials. Figure 3 presents the project profile.

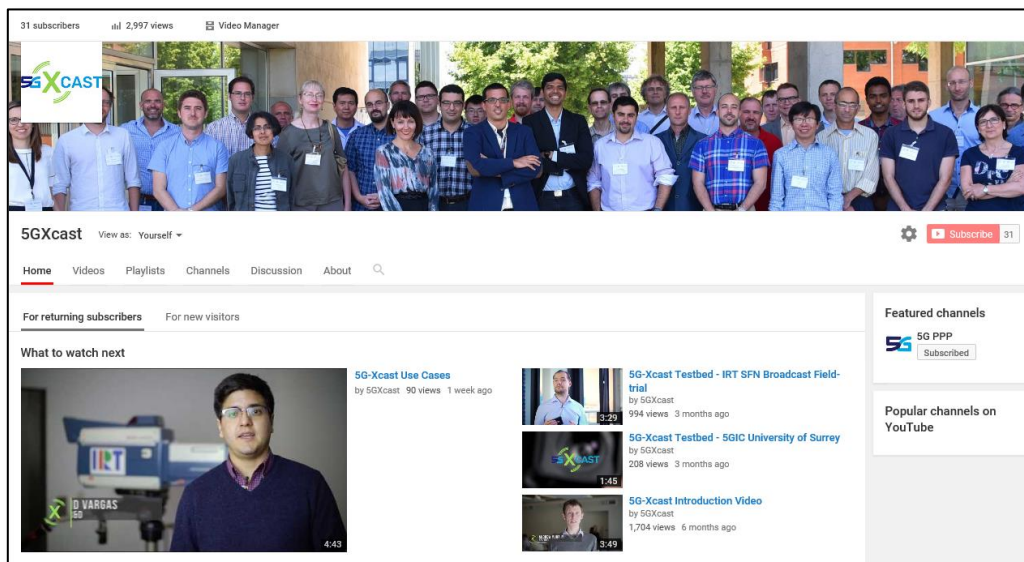


Figure 3. 5G-Xcast YouTube profile.

Up to now, four videos have been released:

- 5G-Xcast Introduction Video
- 5G-Xcast Use Cases
- 5G-Xcast Testbed – 5GIC University of Surrey
- 5G-Xcast Testbed - IRT SFN Broadcast Field-trial
- 5G-Xcast Animation Video

The number of subscribers has periodically increased, having 31 at the moment. The 4 videos accumulate a total number of 3095 views, with 5954 minutes (4 days and 3 hours).

The countries with higher number of views are:

1. Finland (713)
2. Germany (528)
3. United Kingdom (486)
4. Spain (260)
5. United States (226)
6. India (125)
7. France (93)
8. Mongolia (58)
9. Canada (48)
10. Italy (43)

The videos have reached people with the following age:

- 25-34 years old (13.4%)
- 35-44 years old (31.6%)
- 45-54 years old (49.4%)
- 65+ years old (5.6%)

The following devices have been used:

- Computer (70.2%)
- Mobile phone (24.7%)
- Table (4.4%)
- TV (0.6%)

10 News and Press Releases

Concerning the press, contacts are being established with the relevant trade press in order to extend the reach of the communication activities.

1. Nomor “Nomor Research to develop cross-layer optimized solutions for 5G multicast/broadcast as part of the 5G-Xcast project,” June 2017.
2. UPV “La UPV lidera un proyecto europeo para el diseño de una innovadora arquitectura de red 5G,” July 2017.
3. UPV “The MCG leads a European project for new 5G communications,” July 2017.
4. Expway “Expway Extends LTE Broadcast to Multi-media Distribution Over 5G,” Sep. 2017.
5. IRT, Nokia “5G: Bridging mobile broadband and broadcast networks,” Oct. 2017.
6. BBC “5G-Xcast: A European-funded research project to develop broadcast and multicast within 5G,” Nov. 2017.
7. Broadpeak “Broadpeak Leads Technology Innovation for Content Delivery Over 5G Networks,” Feb. 2018.
8. Nokia “5G Deemed a “Key Enabler” for New Markets,” Interview in Radio World, Apr. 2018.
9. Nokia “5 new things I learned about 5G at NAB”, Apr. 2018

The official 5G-Xcast website has periodically released news related to the project or broadcast/multicast activities in 3GPP and other standardization bodies:

1. Keynote Speech at IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB 2017).
2. EUCNC 2017 Poster Session.
3. EUCNC 2017 5G-PPP Special Session.
4. 5G-Xcast Kick Off Meeting in Valencia (UPV).
5. 5G-Xcast project presented at IEEE 5G Summit Thessaloniki.
6. Joint meeting with 5GPPP Sat-5G project at 5GIC.
7. 5G-Xcast 2nd Face to Face Project Meeting in Surrey University, Guildford UK.
8. 5G-Xcast presented at the 5G C-Tech Forum at IBC 2017.
9. First advisory board meeting of 5G-Xcast at IBC 2017.
10. 5G-Xcast present at the FOBTV Session at IBC 2017.
11. 5G-Xcast project presented at IEEE 5G Summit Helsinki.
12. CrownCom17 invited paper on “Designing a Testbed Infrastructure for Experimental Validation and Trialling of 5G Vertical Applications”.

13. 5G-Car & 5G-Xcast Collaboration.
14. 5G-Xcast participates at IEEE 5G Summit Montreal.
15. Presentation of 5G-Xcast at DTG Spectrum Access Forum.
16. PIMRC 2017 Panel on Unlicensed spectrum.
17. Deliverable D2.1 – Definition of Use Cases, Requirements and KPIs – Now Available.
18. 5GPPP Phase II Research & Innovation Projects Brochure.
19. IEEE 5G World Forum 2018 – Disrupting Media and Entertainment in the 5G Era.
20. IEEE BMSB 2018 – Workshop on Point-to-Multipoint as Key Technology Element for 5G Systems.
21. 5G-Xcast at EBU Forecast 2017.
22. Deliverable D5.1 – Content Delivery Vision – Now Available.
23. Deliverable D3.1 – LTE-Advanced Pro Broadcast Radio Access Network Benchmark – Now Available.
24. 5G-Xcast 3rd Face to Face Project Meeting in IRT, Munich, Germany.
25. Point to Multipoint (PTM) will be one of the major items in the next phase of 3GPP work.
26. 5G-Xcast present at BES Expo in India.
27. 5G-Xcast participates at IEEE 5G Summit in Trento.
28. Fairspectrum and Turku University of Applied Sciences demonstrate Licensed Shared Access on 2.3 GHz band.
29. Study on Implications of 5G Deployment on Future Business Models referencing 5G-Xcast.
30. 5G-Xcast presentation at the WIVE project seminar on “The future of media in 5G”.
31. DVB publishes draft Multicast-ABR logical reference architecture.
32. 5G-Xcast TM presentation at the 2018 NAB show.
33. One5G and 5G-Xcast workshop at the IEEE WCNC 2018 Conference.
34. 5G-Xcast TM talk at the IEEE WCNC workshop on intelligent computing and caching network edge.
35. 5G-Xcast 4th Face to Face Meeting hosted by EBU in Geneva.

11 Meetings with the Advisory Board and other 5G-PPP Projects

Project partners have also participated in additional meetings with the Advisory Board:

1. IBC 2017, Amsterdam, Netherlands, Sep. 2017.
2. IEEE BMSB 2018, Valencia, Spain, June 2018.

Moreover, two meetings for potential collaboration with other 5G-PPP projects took place:

1. Joint meeting with SAT-5G, University of Surrey, Guildford, UK, Sep. 2017.
2. Joint meeting with Bluespace, UPV, Valencia, Spain, Feb. 2018.

References

- [1] The Institute of Electrical and Electronics Engineers, Inc. "IEEE Policies", 2016.