# IEEE CESoc TV Analytics (2012–2016)

IEEE CESoc TV is the YouTube broadcast channel of the IEEE Consumer Electronics (CE) Society. The channel started at the 2012 International Conference on Consumer Electronics (ICCE)-Berlin conference and went live on 22 September 2012. Today, CESoc TV is like TV-on-demand, with a collection of programs previously recorded. To date, 809 videos have been produced and can be found across 65 playlists (http://www.youtube.com/user/ieeeCESocTV). Eight playlists were created in 2012, 12 in 2013, 19 in 2014, 20 in 2015, and six so far in 2016. At the time this article was written, the CESoc TV videos were viewed 46,796 times. The CESoc TV watch time is 105,973 min, or more than 1,766 h.

The video company that produces materials for CESoc TV is St. Petersburg State University of Film and Television in St. Petersburg, Russia. St. Petersburg State University of Film and Television is the oldest Russian institution in the fields of photography, cinematography, and television. The structure of the university and its degree programs are compatible with the nature of film and television industry, which both incorporate the arts, technology, and business. This naturally corresponds to the main directions of training: screen arts, media technology, and economics and management. More information can be found at http://en.gukit.ru.

Video recordings of 12 CE conferences held over 2012–2016 are currently available on the CESoc TV website. CESoc TV provides the opportunity to review the latest scientific and technical achievements for those scientists and engineers who could not attend the IEEE CE conferences in person. Any conference is a place of disputes and exchanges of scientific ideas. Viewing the video reports allows people, to some extent, to experience the atmosphere of the conference and encourages the viewer to consider and search for new ideas.

Viewing a video report may be useful even for the conference participants. It allows them to listen to an interesting presentation again for details they may have missed and to get a better understanding of initially unclear concepts. With the help of CESoc TV, conference participants can listen to and watch the video of the missed session at their convenience.

The structure of the university and its degree programs meet the nature of film and television industry, which both incorporate the arts, technology, and business.

Outstanding representatives of the scientific and technical community usually attend CE conferences. Their opinions about the direction of the industry are of interest to all researchers. A large number of keynote presentations and interviews recorded during 2012–2016 CE conferences can be found at the CESoc TV site. It is important to mention the interview with K. Brandenburg and K. Immink making a decisive contribution to MP3 format development and optical storage devices like CDs and DVDs; the interview with U. Reimers, who is well known for his great contribution to digital video broadcasting; the keynote speech of Shuji Nakamura, Nobel Prize winner in physics for the invention of the blue LED laser and solid-state light; the interview with Martin Cooper, who invented the mobile phone; and the keynote speech of Steven J. Sasson, who designed the first digital still camera.

IEEE CESoc TV is a source of knowledge for those who study CE, for example, students. Recordings of all the tutorial sessions from 2012–2016 CE conferences can be found at the CESoc TV site. It is important to note that this knowledge has not yet been included in books and textbooks, which makes CESoc TV particularly relevant. Recordings of CESoc TV can also be extremely useful for students studying technical English and participating in the IEEE Technical English Program.

Young professionals, who usually make poster presentations at CE conferences, can promote their works on CESoc TV. Every CE conference has a playlist titled "Poster Presenters' Interviews." Each playlist is a collection of 1-min interviews. However, these videos are not like typical interviews with a series of questions. Instead, all poster presenters answer the same question: "What is the main idea and the main result of your research?" It is a challenge to give a clear answer in just 1 min. But practically all of the poster presenters have prepared for a 1-min interview. They follow our advice at the end of all the CESoc TV videos: "Make yourself famous on YouTube.com/ieeeCESocTV!"

## VIEWS REPORT

YouTube Analytics helps us understand how well different videos keep viewers engaged. The first metric that can be used for this purpose is the total number of views. The cumulative number of IEEE CESoc TV views is shown in Figure 1 for the interval 1 October 2012–29 February 2016. The number of views increased constantly and reached 45,228 by 29 February 2016. It can be seen that the number of views increased faster in the end of this period than in the beginning. In November 2012, the number of views went from 77 to 777 (an increase of 680), but in February 2015, the number of views

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climbed from 43,048 to 45,228 (an increase of 2,180).

A more informative metric is the monthly number of views (Figure 2). The maximum numbers displayed in Figure 2 can be associated with the months of CE conferences. There are no significant maximums during the first year of CESoc TV since our YouTube channel was not yet well known. The first significant maximum number can be seen in October 2013. There is no doubt that it is the result of the ICCE-Berlin, Germany, 2013 conference, when many videos were posted on the site. The next maximum number was in January 2014, when the monthly number of views became greater than 1,500 (ICCE-Las Vegas, Nevada). One can see maximums in May–June 2014 (ICCE-Taiwan), September–October 2014 (ICCE-Berlin and GCCE-Tokyo, Japan), January–February 2015 (ICCE-Las Vegas), July 2015 (International Symposium on Consumer Electronics [ISCE]-Madrid, Spain), October 2015 (ICCE-Berlin), and February 2016 (when videos about ICCE 2016 were posted).

The global maximum of the monthly views for these years (2,180) was in February 2016. The CESoc TV video team did not attend GCCE in 2015; if GCCE 2015 videos had been published on the channel, this maximum would have been greater. It is interesting that the minimum numbers of views in 2015 is greater than the maximum ones in the beginning of the CESoc TV lifetime. The number of the videos posted on the channel after every conference does not change significantly. So the constant increase in monthly views can be explained by the fact that the popularity of CESoc TV is growing.

It is interesting to know how many different people have viewed CESoc TV. Unique users is a common measurement of the popularity of a website. It measures the distribution of the website content to a number of distinct consumers. Potential advertisers can use this information. A website's unique users are usually measured over a standard period of time, typically a month.

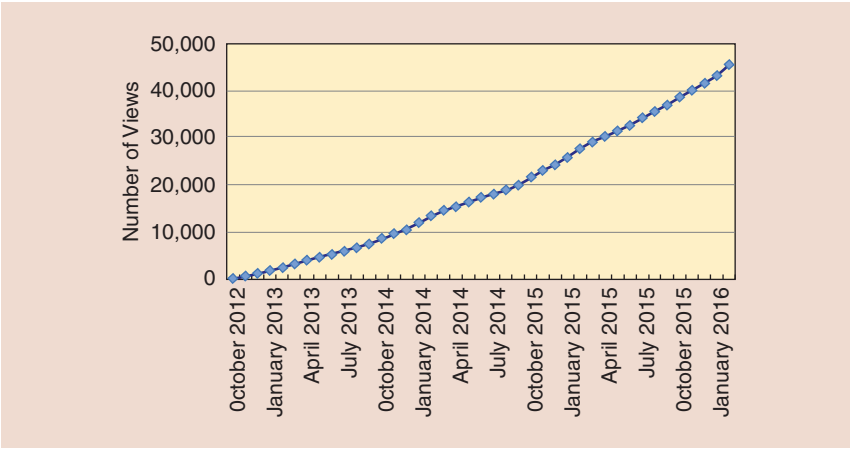


**FIGURE 1.** IEEE CESoc TV's cumulative total number of views.

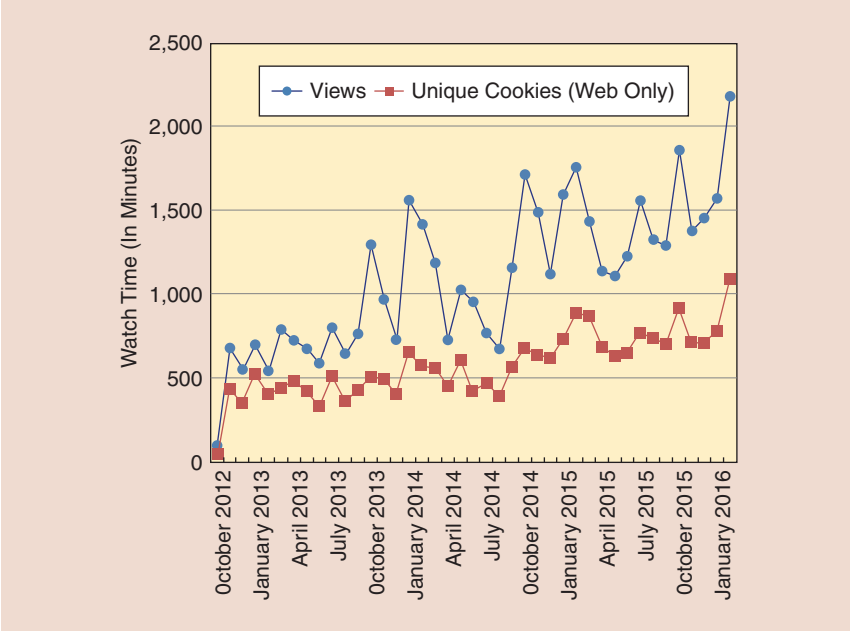


**FIGURE 2.** IEEE CESoc TV's monthly number of views (views and unique cookies).

Unique user counts for websites are typically tallied by using cookies. When a browser visits a website, the website checks for the existence of a particular cookie. This is roughly equal to the number of different people who viewed this content on a browser multiplied by the number of different browsers they used to view it. This does not include views on mobile device apps or TVs. YouTube analytics for CESoc TV shows that the number of unique cookies (web only) is about two times fewer than the number of views every month. So the number of different people who viewed CESoc TV each month is roughly up to half of the number of monthly views (Figure 2).

The geography of views is shown in Figure 3. The chart shows the total views for the selected region for all the date ranges; the greatest number of views was in the United States. The test views of our video team's testers and the views of ordinary Russian viewers cannot be separated with the help of YouTube Analytics (which is why the data of the Russian region can be incorrect and were excluded from the list). The total number of views and watch time does not represent the Russian public correctly and is much higher because of the testers' views.

Activity from viewers who are logged in and subscribed to the channel

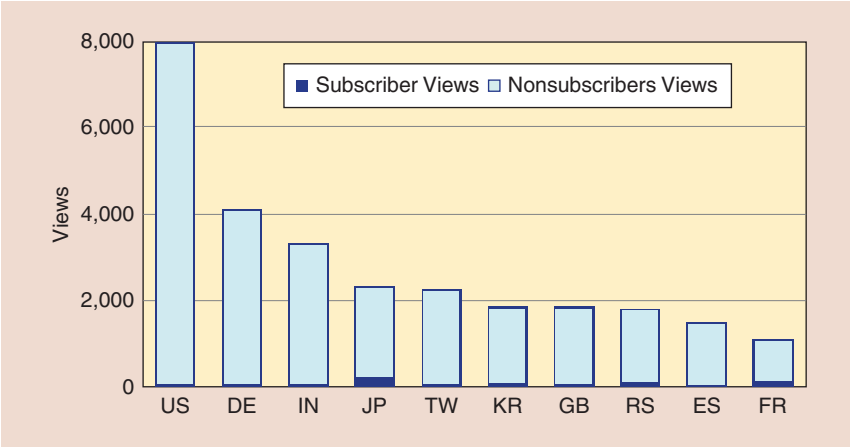


**FIGURE 3.** The geography of views. US: United States; DE: Germany; IN: India; JP: Japan; TW: Taiwan; KR: South Korea; GB: Great Britain; RS: Serbia; ES: Spain; FR: France.

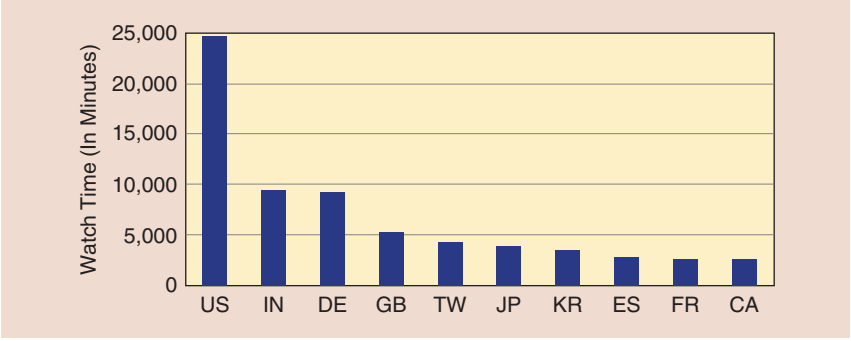


**FIGURE 4.** The geography of watch time in minutes. US: United States; IN: India; DE: Germany; GB: Great Britain; TW: Taiwan; JP: Japan; KR: South Korea; ES: Spain; FR: France; CA: Canada.

is shown in Figure 3 as well. This activity is not significant (the average is 3.5%). Most viewers (93%) are viewing when they are logged out or not subscribed to the channel of the video. The subscription status of some viewers (3.5%) is unknown.

## WATCH TIME REPORT

Watch time is a more meaningful metric than views alone. Watch time helps creators understand how well different videos keep viewers engaged. Figure 4 illustrates the geography of CESoc TV watch time (in minutes) for the interval 1 October 2012–29 February 2016. One can compare Figures 3 and 4. The greatest watch time is for the U.S. region, as well, with the Indian region in second place. Canada is on the first ten regions list.

Figure 5 shows that the top videos of CESoc TV ranged according to the watch time (estimated total minutes of viewing time of CESoc TV videos from the audience). "Average percentage viewed" means average percentage of a video the CESoc TV audience watches per view. The first video, "Standardization of High-Efficiency

| Video | Video Created | Watch Time (Minutes) | Average Percentage Viewed |
|---|---|---|---|
| Standardization of High-Efficiency Video Coding (HEVC) | 31 October 2012 | 16,176 | 7.14 |
| A Market Driven Architecture–The Standard for an Architectural Framework for the IoT | 1 February 2015 | 6,181 | 16.98 |
| Fast Motion Estimation Algorithm for HEVC | 31 October 2012 | 5,008 | 13.02 |
| Mihaela van der Schaar Keynote Speech | 13 June 2014 | 3,456 | 9.69 |
| One Implementation of Adaptive Streaming over HTTP on Android DTV Platform | 31 October 2012 | 2,482 | 18.89 |
| Bjoŕn Schuller Keynote Speech | 18 October 2013 | 2,480 | 10.41 |
| Quadtree Structures and Improved Techniques for Motion Representation and Entropy Coding in HEVC | 31 October 2012 | 2,351 | 13.24 |
| IEEE CESoc | 15 October 2013 | 2,104 | 31.05 |
| The Future of Sound Quality in the Audio Industry | 5 February 2015 | 1,840 | 31.36 |
| Math Bollen Keynote Speech | 18 October 2013 | 1,495 | 15.07 |

**FIGURE 5.** The top 10 CESoc TV videos.

Video Coding (HEVC)," was posted on 31 October 2012 (more than three years ago). The second video, "A Market-Driven Architecture—The Standard for an Architectural Framework for the IoT," was published on 1 February 2015 (only a year ago). But the average percentage viewed for this video is rather high. The distribution of the watch time for the first video can be found in Figure 6. The distribution of the watch time for the second video can be found in Figure 7.

The average (on the interval of a year) watch time for the first video is roughly constant from the middle of 2013. But a significant local maximum can be seen in July 2015. This can be explained by publishing many videos about ISCE 2015 with the main topic "The Future of Video Applications." However, one can see no maximum in January–February 2016, when ICCE in Las Vegas was held and new videos were published. This conference did not increase the interest of the first video (Figure 6), which can be explained by the fact that ICCE 2016 conference papers did not analyze video compression methods and video processing because the conference theme was "Internet of Me: Next Gen of Consumer Connectivity."

The IoT was discussed at ICCE-Berlin in 2015 and ICCE-Las Vegas in 2016. That is why the influence of these conferences, and videos about these conferences published on the popularity of the second paper (Figure 7), was significant. One can see local maximums of watch time in September–October 2015 and January–February 2016.

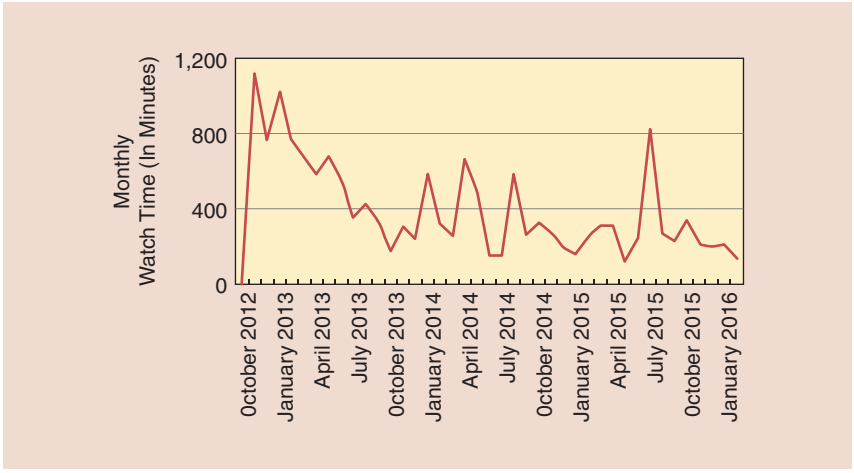


**FIGURE 6.** The "Standardization of High-Efficiency Video Coding (HEVC)" video: the distribution of the watch time.

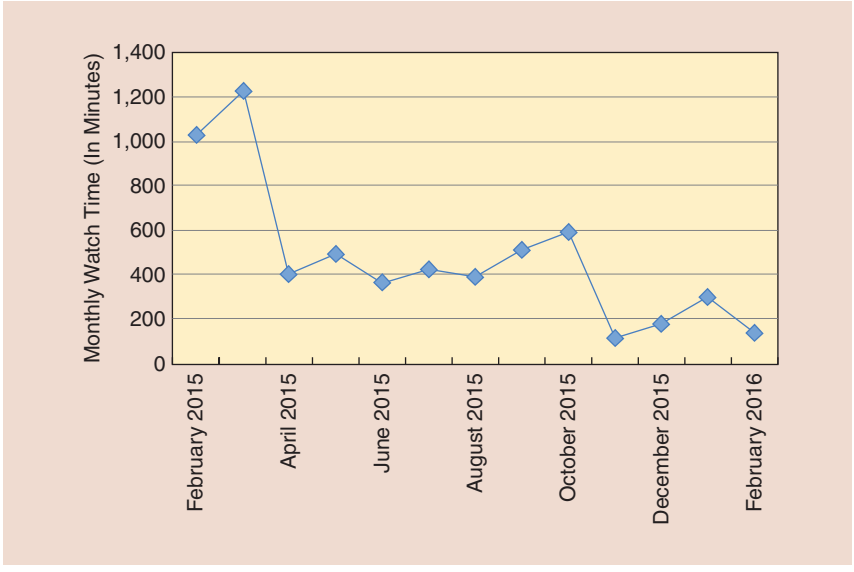


**FIGURE 7.** The "A Market Driven Architecture—The Standard for an Architectural Framework for the IoT" video: the distribution of the watch time.

## DEVICES REPORT

The devices report gives information on the different devices and operating systems that viewers use to watch CESoc TV videos. The physical form factor of the device on which the view occurred is shown in Figure 8. The most popular device is a desktop (more exactly, laptop and desktop computers) at 79%. The mobile phone comes in second place at 11%, and tablets are in third place at 5%. The software systems of the devices on which the view occurred is shown in Figure 9. Windows is used most often

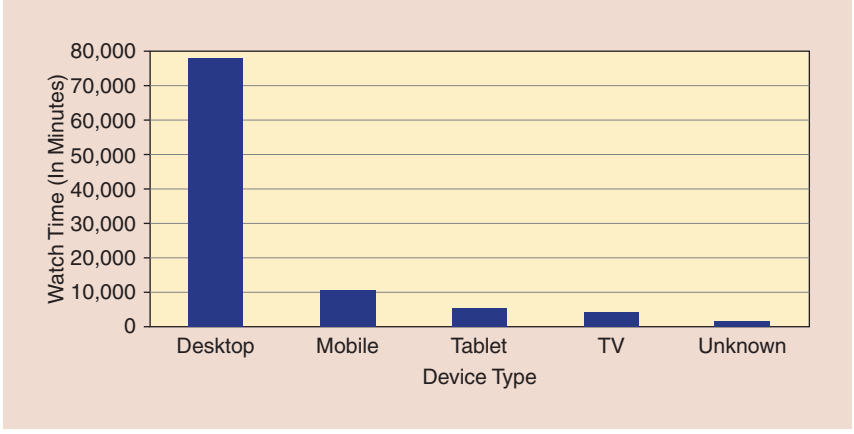


**FIGURE 8.** The devices used to watch CESoc TV videos.

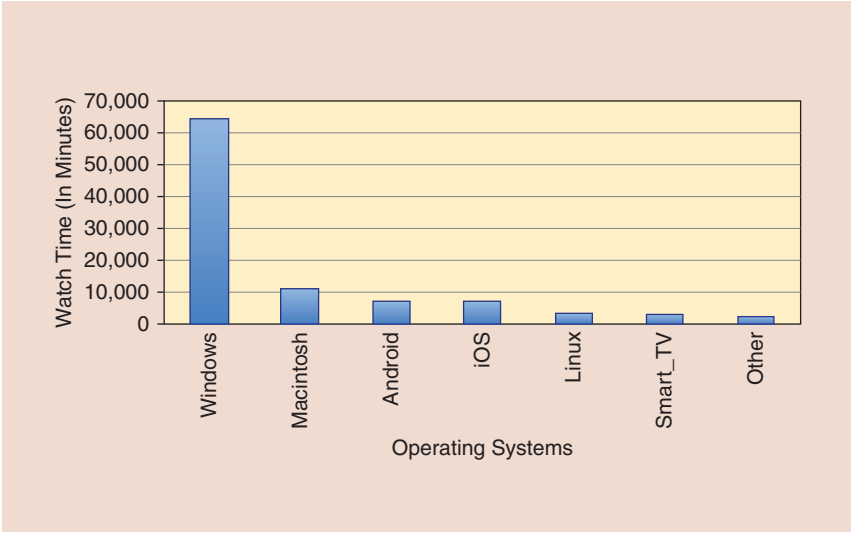


**FIGURE 9.** The operating systems used to watch CESoc TV videos.

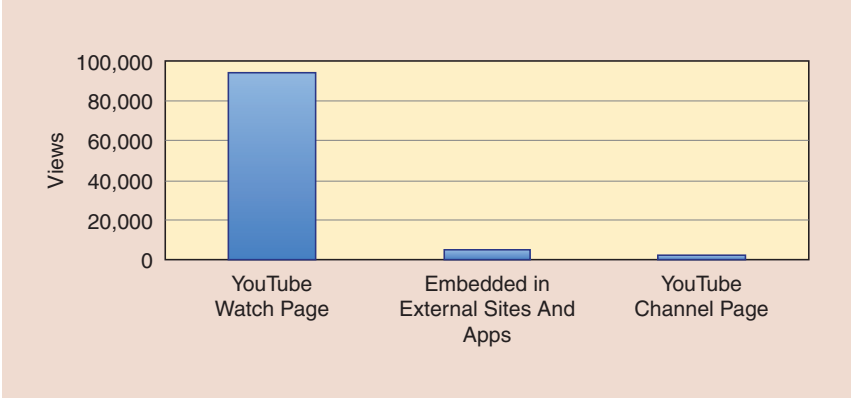


**FIGURE 10.** The playback locations for CESoc TV views.

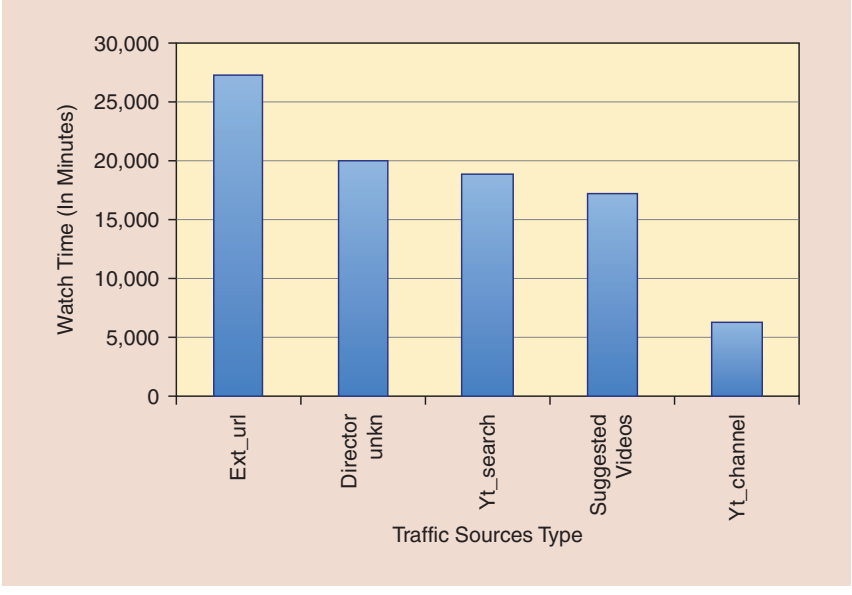


**FIGURE 11.** The traffic sources for CESoc TV views.

(65%). Macintosh OS is used 11%, Android OS 7.4%, and Apple iOS 7.3%. This information is important when thinking about a conference paper and how it will appear on the Internet.

## PLAYBACK LOCATIONS REPORT

The playback locations report shows the pages or sites on which CESoc TV videos are being viewed. The top three playback locations can be seen in Figure 10. These are "YouTube watch page," "embedded in external sites and apps," and "YouTube channel page." "YouTube watch page" means that the video was watched on YouTube from the video's specific page or the precise URL where one can watch the video on YouTube. It is YouTube's individual video page on YouTube.com and YouTube apps—the most common viewing page on YouTube. This location has 92% of the total watch time. "Embedded in external sites and apps" shows how often viewers watched a CESoc TV video when it was embedded on another website or app. This location has 4.7% of the total CESoc TV watch time. The top three sites of this location type are IEEE.org (41%), Facebook (16%), and ICCE.org (14%). "YouTube channel page" means that CESoc TV videos are viewed directly on a channel page. This location has 1.9% of the total CESoc TV watch time. Number 1 of this location type is IEEE CESoc TV (94%).

## TRAFFIC SOURCE REPORT

The traffic sources report shows the sites and YouTube features that viewers use to find CESoc TV content. We can use it to get insight into the many ways viewers find our videos. The top five traffic sources for CESoc TV videos, ordered by watch time, can be seen in Figure 11. This report is available from 15 January 2013. There are two main groups of traffic sources: views from sources within YouTube and those from external sources.

Traffic from sources within YouTube includes watch time and views on a desktop, YouTube mobile apps, and other features within YouTube. "YouTube search" means traffic from search results on YouTube. One can also see the search

| Top Locations | Views | 13–17 | 18–24 | 25–34 | 35–44 | 45–54 | 55–64 | 65+ |
|---|---|---|---|---|---|---|---|---|
| United States | 8,001 | 1.1% | 14% | 37% | 23% | 13% | 6.1% | 6.7% |
| Germany | 4,071 | 0.0% | 17% | 51% | 18% | 4.7% | 2.0% | 7.4% |
| India | 3,306 | 0.5% | 41% | 47% | 9.1% | 2.1% | 0.6% | 0.2% |
| Japan | 2,327 | 0.1% | 16% | 47% | 15% | 12% | 2.0% | 7.2% |
| Taiwan | 2,243 | 0.7% | 24% | 36% | 28% | 5.4% | 4.8% | 0.7% |
| South Korea | 1,826 | 0.2% | 12% | 49% | 33% | 5.1% | 0.6% | 0.4% |
| United Kingdom | 1,819 | 0.9% | 16% | 52% | 19% | 7.5% | 2.6% | 2.8% |
| Serbia | 1,788 | 0.4% | 58% | 31% | 6.9% | 1.6% | 1.0% | 1.7% |
| Spain | 1,475 | 0.0% | 22% | 44% | 20% | 7.9% | 5.0% | 0.7% |

**FIGURE 12.** Demographics: the age range distribution of the audience of CESoc TV.

terms used by viewers if provided by the user's browser/player. The watch time of this traffic source is 17,710 min (18%). The top two search terms are "HEVC" (7.6%) and "Mihaela van der Schaar" (2.8%). The list of search terms used is very long and includes "high-efficiency video coding," "HEVC algorithm," "HEVC tutorial," "motion estimation," "academic writing skills," "Internet of Things," "adaptive streaming," "Jens Rainer Ohm," "Bjorn Schuller," "Hans Cycon," and "Joe Decuir."

"Suggested videos" means the views from suggestions appearing alongside or after other videos. The watch time of this traffic source is 16,774 min (17%). The list of videos watched due to suggestion is very long, with the top five being "Elemental Insights Webcast|HEVC/H.265" (5.5%), "A Market Driven Architecture—The Standard for an Architectural Framework for the IoT" (5.2%), "Interview with Mihaela van der Schaar" (4.4%), "Standardization of High-Efficiency Video Coding (HEVC)" (3.9%), and "H.265 vs. H.264: Choosing the Best Options" (3.9%).

"YouTube channel" means traffic from other creator and topic channels. Topic channels are automatically created based on YouTube's video discovery system. The watch time of this traffic source is 6,068 min (6.2%), with the biggest traffic source being the IEEE CESoc TV channel (95%), followed by "Acoustics–Topic," "Magnanil Goswami," and "Abdullah Almuttiri."

The demographics report helps us understand the gender and age range distribution of the audience of CESoc TV.

"Traffic from sources outside of YouTube" depicts watch time and views resulting from links outside of YouTube, such as through a Google search, Facebook, and other websites. "External URL" means traffic from websites and apps that have YouTube CESoc TV video embedded or linked. One can see what websites and apps are embedding our videos in the Playback Locations Report. The watch time of this traffic source is 26,555 min (27%), with the top five sources being Google search results, which no longer provide a search term and link to YouTube videos (50%); other Google domains (15%); IEEE.org (6.6%); Wikipedia.org (6.2%); and Facebook (4.5%). "Direct or unknown sources" means traffic from direct URL entry, bookmarks, and unidentified apps. The watch time of this traffic source is 18,659 min (19%).

## DEMOGRAPHICS REPORT

The demographics report helps us understand the gender and age range distribution of the audience of CESoc TV. It's based on logged-in users on all devices. The gender distribution of the audience of CESoc TV 84% male and 16% female.

Figure 12 shows the distribution of our viewers by age for the top ten regions ordered by the views number. It is worth noting that for most regions, the age of the greatest part of the viewers is in the interval of 25–34 years, but viewers from Serbia and India are even younger. The majority (58%) of Serbian viewers are 18–24 years old, 89% of the viewers from Serbia are 18–34 years old, and 88% of Indian viewers are 18–34 years old. This data confirms that CESoc TV attracts the attention of young people.

## CONCLUSION

The YouTube IEEE CESoc TV broadcast channel and IEEE CE websites (including conferences sites) are now being cross-linked: this means that the IEEE CE is promoting the channel, and IEEE CESoc TV is promoting the CE and its conferences. This cross-linked interaction has a synergetic effect.

CESoc TV plays an important role in enhancing the attractiveness of conferences for CE Society members and in promoting the leading role of the IEEE CES among the community of consumer electronics researchers, engineers, and students. CESoc TV stimulates young consumer electronics researchers, engineers, and students to contribute to CE activities.

—Konstantin Glasman