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THE FUTURE OF TELEVISION FOR EUROPE WORKSHOP
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     >> Recording in progress.
     >> STEFANO POLIDORI: Ladies and gentlemen, good morning, good afternoon, and good evening. My name is Stefano Polidori, I'm the chair of Study Group 9, it's a great privilege for me to welcome you all to the workshop on the region of Europe. This is fifth to discuss the future of TV, and from all perspectives, broadcasting, broadband, cable, and this is the second event in the series.
     So I see many participants connected today and I look forward to your active participation during our discussion. I invite you to drop a line on the chat, to say your name and the country, where you come from.

Today the event is equipped with realtime captioning. You can activate by clicking on the related icon on the bottom of the screen. In addition, British sign language has been organized and will be available throughout the event.

During the session today, you will be able to write your question using the Q&A chat. Please do not use the other chat for questions.

We are privileged to have with us a distinguished guest and dignitary TSB, Chaesub Lee. I would like to give the floor to Dr. Lee to give his remarks.

>> CHAESUB LEE: Shank you Stefano. It's my pleasure to welcome to you today's workshop. I hope everybody, is in good health and good spirits.

This Sunday, the 21st of the November, we will have world television day. TV keeping the world informed and connected, and the resulting influence that TV has on our decision-making, influencing that has been in sharp focus throughout the COVID-19 pandemic.

ITU is a key figure in the story of the TV's history, and we will play an equally important part in shaping its future: The 1950s saw a boom in TV ownership and ITU standards were instrumental in making this possible to the technical standards for TV released in 1949. Today, around 485,000 broadcasting TV and sound frequency registrations are mandated by ITU.

ITU has received two Emmy awards for our work on broadcasting standards and two Emmy awards for our work on video compression standards. So today, we will explore the state-of-the-art and the prospect for innovation. We will gain fresh insight on the latest advances at the intersection of AI, immersive media and personalized services, looking at how these advances will change the way we experience business, health, education, and entertainment, as well as how they will change the way persons with disabilities experience daily life.

So we will focus on the envisions of the European countries and we will see how ITU can assist you in achieving these ambitions. We welcome the representatives of regulatory authorities, industry, and research encouraging our discussion, including all perspectives on the future of TV. All sectors of ITU are represented, ensuring that our discussions benefit from ITU expertise in our record -- in our radio communications, standardization and development of TV bureaus. I would like to thank the

European Broadcasting Union for its strong support in designing our program, as well as speakers and moderators and all participants for your contributions to our discussions today.

    We are very fortunate to welcome experts to have a great discussion. And I wish you great dialogue and find good success and results today. Thank you very much.

    >> STEFANO POLIDORI: Thank you very much, ITU director, for your inspiring words. The sessions ahead of us we will elaborate on the future of TV for all of those aspects. Today's opening ceremony is concluded. We do not delay, also because we started five minutes late and we apologize for that. I wish to invite the moderator of the session one to kick off the first session of this workshop, that will discuss the national and European plans for television. Mr. Jaroslaw Ponder, head of the ITU office for Europe, the floor yours.

    >> JAROSLAW PONDER: Thank you very much, Stefano, and good morning, good afternoon, and good evening to all of you. A special welcome to our panelists whom we will hear from shortly. As Stefano said, it's my great pleasure to be with all of you and taking a look at how we can advance the future the television. The spectrum, the regulatory frameworks are in spotlights of the governments and other stakeholders seeking to improve the quality of television services in Europe and beyond. ITU, as well as the European authorities are facing challenges and new opportunities in the roll out of television over any media. The case of the cable TV offers and satellite and over-the-air services to name a few.

    It's now my great pleasure to open session one, which will focus on the national and European plans for the television. I warmly welcome our distinguished panelists that will share with us national and European plans when it comes to television policy, and standardization. I have with -- we have asked today Jenny Weinand, senior legal counsel of EBU who will explore initiatives regarding media policy for TV in the European region. We have also Sebastiano Trigila, chairman of the high definition in Italy of the FUB from Italy, who will discuss what policy options exist in Italy regarding the future of TV.

    We have also David Hemingway, chair of spectrum group of the EBU and Elena Puigrefagut Coarasa senior project manager of the EBU who will give a short presentation on the existing spectrum challenges relating to the

intraterrestrial in Europe. And we have Andrew Kisaka, head of licensing and Tanzania Communications Regulatory Authority who will share regulations in the trends of television in East African countries making the link between our -- both regions, Europe and Africa and future plans for similar activity in Africa region.

So thank you all for joining us today, and to share with your knowledge and expertise. I would like to give the floor to Ms. Jenny Weinand to share with us legal actions and media policies in the region. Jenny, the floor is yours.

>> JENNY WEINAND: Thank you very much and hello to everyone. I will share my screen right now and hope this is working fine. Just give it a second for the screen to come up. Yeah? Very good.

Thank you very much again, and I will told be speaking about the future EU policy and regulation. I think what is important to remember is that we -- when we look ahead, we also need to be aware of where we come from. And I would like to, first of all, look into the bit of history of media regulation at EU level. Where do we come from? Media is peculiar area of regulation. It's characterized between nationalized and Member State, and Member State competence and EU competence. So here's where it gets a bit legalistic but bear with me just a second.

In -- putting it in simple words, the Union's competencies are laid down in the treaty. So the EU can only act when it -- when the Member States have transferred the competence to the EU, and the area of media, regulation media law is very specific, because it's an area where competence is shared between the EU and the Member States.

So the ex U has intervened and regular lated certain issues alongside of its Member States, and it has harmonized certain issues at EU level. The basis for this has -- for the time being been the international -- or the internal market. The union has taken action to remove obstacles to the free flow and cross-border circulation of services. So meaning the -- the optic through which the EU has regulated is very much driven by economic liberalization, and it's vex an economic perspective.

So the core EU media law that has developed, let's say, is already more than 30 years old and it's the directive -- first directive in this field was the television without frontiers directive from 1989, which through consecutive reforms has been amended and has also

the scope of this directive has been broadened. So it not only covers broadcasting in the traditional sense, but nowadays, it also sets out rules for on demand services and even since 2018, also for video sharing platforms.

In the areas which it regulates, are basically, it sets rules for advertising, for the protection of minors. It contains rules that promote the distribution and the promotion of European works, and, of course, certain content standards and what should not be broadcast or should be broadcast with caution.

Now, there are, of course, other -- or they have developed throughout the past years and decades, in fact, other EU law that has an influence on the ABMD, and on the key of the media. I won't go through all of these. Just to give you a bit of a feel for actually how many EU legal instruments there are, that have an effect or could potentially have an effect, and these cover areas of e-commerce, of data protection, of platform-to-business or business-to-business relationships, and an area which probably you are more familiar with is also the regulation of electronic communications, spectrum and so on, accessibility is also regulated at EU and copy right, not to get this one.

Already also other soft law instruments that have been developed alongside these more binding legal rules. This is soft law, because the European Union basically -- the European Union does not set binding rules but it facilitates the coordination and the drafting and the development of these rules. So you will find these in the area of hate speech, for instance, where there's a code of conduct or for disinformation, where there is also a code of conduct to which online platforms, stakeholders, can sign up to.

Now, this is to basically tell you that we come from a very economic-driven perspective of the EU as regards market liberalization. More recently, there has, of course, been the fundamental rights dimension that has been added to the -- to the style and the types of regulations and legal instruments that are being adopted at EU level. So where do we go from here?

This is just a statement from Commission President Von der Leyen of last year and it shows you that the EU wants to be a leader in the field of digital regulation, basing the type of regulation on EU values, on EU fundamental rights.

So when we now look ahead, there are several initiatives currently discussed at EU level. You will may have heard of the digital services act proposal, and the Digital Markets Act proposal. These are two initiatives that are running in parallel, and negotiations are still ongoing and they will still be ongoing probably next year.

The aim is to design a modern and future-proof EU platform regulation. So rules -- setting rules for EU digital players or digital players based in the EU or those that direct their services to the EU, meaning generally social networks, search engines, online marketplaces.

And the overall objective is to create, first of all, a safe -- a safer digital space, protecting fundamental rights, and also to establish a level playing field for businesses. So a fairer platform environment.

The DSA more specifically sets out or will set out new responsibilities for online intermediary, online platforms to fight against illegal content. For example, the DSA will contain harmonized notice and action mechanisms whereby users can flag illegal content online and it will also contain the liability exemptions of whether platforms are liable for illegal content or not. It will contain transparency obligations, for example, as -- in relation to recommended systems of platforms or the terms and the conditions of platforms. There will be reporting obligations and also special rules for the very large online platforms, which bear the most risk of spreading illegal content.

So -- and as a second -- in a second instance, the DSA will also contain certain rules that would create a fairer and more transparent online environment for business users. For instance, regarding transparency of online advertising or knowing which customers are actually promoting their services and selling their services on the platforms. This is the so-called know your business customer.

The DMA will compliment the DSA this that it will tackle the gatekeeper power of very large online platforms. By identifying certain special harmful -- specific harmful practices. Now, we all know which power and impact online platforms can have or have in today's societies, and this would -- this would -- is an attempt to recalibrate and rebalance that relationship between users and platforms and between -- including, of course, business users such as broadcasters, for instance.

The DMA would contain a prohibition of

self-preferencing in ranking for certain types of gatekeeper platforms call core platform services. It would also contain or will probably contain a prohibition of bundling practices. Bundling is a practice whereby a user must sign up to one service in order to use another service. And it will also contain rules around the access to data or the prohibition of containing and combining data, preventing platforms from combining data across different services, unless the user, of course, consents to such combination.

Now, perhaps briefly also I would like to mention a couple of other initiatives and there is many more to come. We can expect, of course, that the EU will further engage in nowadays what we call media regulation, but which is nowadays, of course, broader than just broadcasting and TV. It has developed, in fact, into media and platform regulation.

And these developments are -- or the EU will engage in this exercise because, of course, of convergence of media, because of markets, developments and technological progress, and also given the importance of platforms for the distribution of media content, and the challenges that come from -- that come from this, including, for instance, the spread of disinformation, or political advertising, biasing, influencing, manipulating local elections.

I think it's also worth while, again, to reiterate the importance of media for democracy and for public opinion forming media is capable of holding power to account. This is still today one of its roles in democracy and in our societies, and the EU is slowly also looking at this angle. The proposed or the envisaged and the foreseen Media Freedom Act, which has been announced by the EU, but which has not materialized in a proposal, in a concrete proposal from the commission just yet. So we are waiting to see what the Media Freedom Act will be. This is precisely the perspective that the EU takes. It's more related to the cultural and the fundamental rights dimension. So it's -- the EU is slowly moving away from this purely economic-based media regulation, taking into account fundamental rights and the cultural perspective which is underlined by the promotion of media freedom, media pluralism and media independence.

And I think I will leave it at that for the time being, if you have questions, I think we can get to them at the end of the session. Thank you.

>> JAROSLAW PONDER: Thank you very much, Jenny, for this presentation, and now I would like to invite Sebastiano Trigila, to share the perspective of Italy. So Sebastiano, the floor is yours.

>> SEBASTIANO TRIGILA: Thank you very much. Good morning to everybody. I'm very honored for the invitation, and I thank Stefano Polidori and the organizers for this.

Let me share the screen.

Can you see my screen?

>> JAROSLAW PONDER: All good.

>> SEBASTIANO TRIGILA: Okay. So this title is a very compelling title, because it's difficult for one person to imagine that and to spend evolution scenarios for the future of television in Italy because it's so complex. So I will try to do my best.

So basically, I have the agenda, but it is organized in two parts, the terrestrial, and then broadcast and broadband, under the umbrella of the new standard DVB-I in Italy. The evolution of broadband, in some sense.

Today's television in Italy is divided -- is divided between DTT, or TV satellite. We don't have cable TV and the audience, as you can see is predominantly for the DDT, but the numbers for TV sat,en aOTT are quite important anyhow.

We are currently undergoing a transition from first generation to second generation DVB-T. The first generation that originated in 2008, and last -- the tradition lasted to 2012, is DVB-T is the transmission technique and 20 multiplexes with national coverage. And subregional multiplexes, where we use MPEG 4 for hygienerration service. And in the second generation, we will go to DVB-T2, and 12 multiplexesy plexes, and HEVC later. The competting reason for this transition is to comply with the requirement of freeing the 700 megahertz band in favor the mobile services.

Out of necessity, it will make so that the way it will enhance quantity and quality of current offer to Ma match expected user experience with quality of TV screens.

Constraints that are that the transition should be affordable by broadcasters and users.

So from the user's side, what has been done to prepare and mitigate the measures necessary for the transition? The first generation has been able to have suitable laws already in 2015. We count on natural changeover of TV sets. And if it doesn't suffice, we also subsidize the

receivers and we monitor our receivers constantly.

On the operator's side, they have experienced the assignment of frequencies. So the assignment of national control networks to sly for them through the commission of T1 mux equals .5 T2 mux. All of this will require frequency reforming. So it is important to say that -- it is important to say that the resulting capacity could be somehow lower or higher than previously. We still don't know exactly, because it depends on how much they will push on the new multiplexes. So it's currently competent, but we will also make room for higher resolution content.

So what this will do is phase out p Meg-2 and adopt MPEG 4. And then they will face DVB-T, and they will phase in HEVC.

But anyhow, this -- this roadmap should be a little bit flexible because the -- because they are not ready to abandon SDTV, because a considerable percentage of receivers at home do not yet receive the DVB-2 signals.

Therefore, while we keep fixed for 700 megahertz band, we will -- the result of impact to encoding will be a little built more relaxed or needing these services is not to be, let's say -- the commission by mid-20 21. We will phase out by end of this year. DVB-2T will start January of 2023, and then phase in of HEVC will begin after deployment of DVB-T2 and MPEG 4.

So the new networks will be filled up with a bend of SD and HD. If they want to focus on high quality for mass audience services, it will probably have some challenges on broadband and so that's the logical link between the two parts of the presentation.

Let's move now to broadband solution.

As broadband network grows in Italy. It's available in a huge number of households and often the users done even know that it's connectible to the Internet. OTT services as they come now, as they are associated broadcast services by the PAC formation of DTT or the alone services. Complimentary services or linear services. They have broadcast services or paid TV services or FAST services. Free advertising services have entered recently in Italy.

Let me tell you one thing about this. They have been assigned to the DTT. For the first time, subscribers the user experience can be not taken for granted and does not necessarily compare to all broadcasters. It's not even easy to determine would to blame in the chain. And I referred to some episodes of, let's say poor performance.

They have been very short, but just -- and only minimum. Most delivery is still a problem for server business, but the technology ensures us that the technology is there and it's only a matter of investing as much as necessary and the user experience in watching broadband TV is the same of that as broadcast TV.

Okay. Another phenomenon that we have observed is that in homes there are more and more dual or triple play TV set. But navigation across broadcast and broadband services on the same device is more and more challenging for an overwhelming majority of users. Everything in box must contain or download a widget for the service and this is a challenge for manufacturers. Let's say that for user, it's even worse, because if a user has more than one device, he will face, let's say, complexity in the devices by services.

Ideally, receivers would cope in a unified manner with all linear services and users can navigate and access broadband and broadcast services with a unified service interface. This challenge has been collected, has been met by a new standard by DVB-I.

Now, should anyone in the audience not familiar with DVB-I, what are the objectives and features of DVB-I. I will not go through this slide, because it is perhaps too technical and I will not have time for this.

Let's just -- let me just say that in the devices, enabled to the DVB-I, the users will experience a service access independent of the delivery platform, and may use the most performing version of this service, if the receiver accesses both of them.

HD Italian. We have a book. It publishes the receivers for the Italian horizontal market. The market where the receiver is bought by the provider and not provided by content provider. So in the UHD book, we have declared the mandatory already in December of 2020. Probably record in Europe. However, the forward section of the book sets up some verifiable conditions that will be made for real adoption of the DVB-I. Again, this is a set of -- a set of conditions that we have to verify in the near future, that will allow the areadoption of DVB-I.

Let's point out that it's documented on a voluntary basis by broadcasters and manufacturers. They can access the program to put the conformity level, called bollino, and they purchase the products.

Meanwhile, we should say that it's not just the

technical matter. The market will be concerned between the associations and consumer association, and the complex regulations may arise that attract the attention of not only regulators but also of legislators and regulators.

Now, to adopt this in Italy, we have to have a path to follow. We have to assert and achieve consensus on technical viability, through trials and PoCs. We have to identify and address the regulatory questions that might hinder harmonic development of an integrated broadcast broadband ecosystem.

In the interest of users and the markets.

Now trials and PoCs, they are simultaneously by groups and players. HDFI as such does not organize nor run any PoC, only observes with interest. It has yet to report. And they it's most recently done in our annual conference.

The regulations. Prior to regulations, and prior to the adopt of DVB-I, let's say we don't still know what issues will be relevant for regulations and what others will be made in the current way. Under this carryout, the following are just examples of possible issues. This includes access for every operator. For instance, who will be in charge of maintaining the local service registry? There are others that openly speaking against solutions like brand labeled piece on the remote, and directing user to service or content providers.

Others call for balancing regulations for broadcasters and if they are to compete fairly on the OTT playground. And the -- the legislation implements the directive absolutely the point and the departure it recognizes of possible regulatory issues.

So what we have done? We have not only done --

>> JAROSLAW PONDER: I direct your attention to the time management.

>> SEBASTIANO TRIGILA: Yes, yes, I'm at the end.

>> JAROSLAW PONDER: Thank you.

>> SEBASTIANO TRIGILA: And so we have created an adoption of OT it.

Observatory that I happen to coordinate, whereby we monitor what is international, we monitor regulations across Europe and Italy and we will make single receivers and, yes, the satisfaction of OTT versus broadcast.

Final remarks. We believe that DTT television is there to stay in the foreseeable future, while several broadcasters will increase their presence in the OTT market. It is up to every broadcaster to seek its own

balance of broadcast and broadband channels in terms of quality and technical quality of the offer and target audience.

The linear OTT services will increase more and more along with the progress of ultra broadband in Italy. They will become new ground for competition.

DVB-I, may become -- I say may become, the unifying technical framework for fair competition among the content providers regardless of their deafliry platform. We as HD Forum Italian Association has adopted DVB-I as a mandatory feature for all TV receivers in Italy. It's crucial for harmonized competition in each mark. That's my presentation.

>> JAROSLAW PONDER: I invite our next speakers coming from the EBU, David and Elena to share with us EBU perspective. I just remind the importance issue of the time management. So please be concise, that we have still like a few minutes for any kind of questions. Thank you. Over to you, David.

>> DAVID HEMINGWAY: Thank you. Jaroslaw, good morning and good evening to everybody. I will speak as quickly as I can. Could I ask Sebastiano to stop sharing his screen so I can share mine, please.

Thank you very much. I hope you can see that now and I you are enjoying the what I have on my shirt. It will teach me to wear a stripey shirt. My name is David Hemingway, I work for the BBC in London. I chair the Spectrum Management group and I will talk about spectrum challenges. Yes, we all know that television is changing. Television delivery, DTT will be part of the landscape for the foreseeable future and that does require spectrum.

For terrestrial delivery, we need to ensure that broadcasters have sufficient spectrum to deliver television for the foreseeable future and the spectrum challenges, this is where we move very firmly to the ITU-R sector, are handled at world radio communications conferences, WRC-23 is two years away and agenda item one is one the more contentious issues that's on the agenda for WRC-23.

This is looking at the current and future use of the UHF band for 470 to 694 megahertz and looking at the use of up to 960 megahertz and deciding if regulatory action is needed to reallocate parts of that spectrum for new uses.

So UHF spectrum, that band 470 to 694 is used for DTT broadcasting. It's used by broadcasters and many other cultural organizations for PSME, and radio microphones,

talkback systems, et cetera. Coming from the EBU, we are
focused on public service media. Not all public service
media use DTT. That's perhaps obvious, because public
service media includes radio broadcasters as well. And in
some countries around the world, DTT is not used even for
television broadcasting any longer. That's a very small
minority.

    We all use spectrum for production. PMSE spectrum is
really important for content production.

    As we have just heard, DTT is evolving. We know it's
evolving and moving into new technologies and we talk about
DVB-T and DVB-T2 and different broadcasters and countries
are evolving at different paces. There's a big question
mark whether PMSE, those audio links can evolve to 5G.
Everyone thinks that will be covered by 5G in the future
because we know that 5G will do everything, but it's not so
certain.

    So let's look at what preparatory work going for
WRC-23, 1.5. We created a task group in Study Group 6 to
make that the responsible group for this agenda item and
other Working Parties in the R sector were identified as
contributing groups and those will provide information on
spectrum use and needs for their services in that band 470
to 960 megahertz and the assumptions for sharing
compatibility studies to be done in that band as well, and
all the contributing groups, provide that information to
task group 6/1 by the 15th of May this year, just six months
ago now.

    So 6A did a huge amount of preparatory work to
establish all of this information as accurately as
possible. Let's talk about the spectrum use and needs work
it did. There were two parts of this, consecutive parts.
Firstly, we sent a questionnaire for the director sent a
circular letter questionnaire to all Region 1
administrations and Iran on the current use of the band and
the expected use of the band. There were 24 detailed
questions this that. And we had responses from about 106
Member States in Region 1 which is very high number. And
then we updated this report, BT.2302, in region one and the
Islamic Republic of Iran.

    If you are wondering why Iran keeps being mentioned,
it's because of the Geneva 06 plan which covers region one,
a frequency region -- a regional frequency agreement, and
plan for terrestrial television broadcasting in this band
in Region 1, plus Iran. So Iran often gets added into

discussions in Region 1 on UHF broadcasting. That report,
BT.2302, contains a detailed analysis of the results of
that questionnaire, which I will briefly summarize for you
now.

This is the big final question, what are your future
spectrum needs for broadcasting in the UHF band. And you
can see the answers that were received from Member States
on this map. I very quickly need to say that the
questionnaire from Lithuania has been updated, but it's not
reflected here. Their answer is now red and not burgundy.
Their answer was 224 megahertz. You can see a large
majority of countries expressing the need for 224 megahertz
for broadcasting.

That is 470 to 224 megahertz. 12 countries would like
to keep more than 224 megahertz for broadcasting and with
the what exists in the 700 megahertz band, they can do
that. Seven countries in total said they required less
than 224 megahertz in this band but I think a very clear
majority. We are talking about Europe. This is a workshop
for Europe. So let's zoom in. This is something I
prepared for the CPT Working Group. This is a CPT
countries, and it's clearer what the requirements under
Europe. You can see two countries -- in fact, I apologize
because I have just noticed on that map Slovenia is not
orange. Slovenia should be orange on that map. I
apologize to Slovenia and Lithuania. Slovenia has
expressed a Ned for less than 224 megahertz. It's on the
previous map. I don't know why this map isn't. Many
apologies for that.

You can see the needs of countries expressed by the
administrations in Europe.

We also did some work on establishing technical
parameters for the broadcasting service for sharing
compatibility studies and we updated this report, BT-2383,
which contains all the typical frequency sharing
characteristics. I quickly want to mention a couple of
other findings from the questionnaire before I hand on.
And that is technological developments in broadcasting.

We asked the question, what technology are you using
and where are you heading? You can see that some countries
are still using DVB-T only. Some have moved entirely to
DVB-T 2 and some have a mixed economy of both DVB-I and 2T
across Europe. We asked a question whether administrations
foresee the need for additional reception modes such as
broadband mobile in the future. This pie chart is for all

Region 1 responses not just for CPT countries. You can see around 50% of administrations said yes, they thought they would be investigating additional reception modes, compares with 26% who said no, they weren't and 29% who didn't know the answer to that question at this point.

Quickly, other uses of the UHF band we asked if administrations had other primary or secondary uses of the band. The vast majority of Europe, as you can see, the vast majority of European countries have secondary services in that band. Primarily, as I mentioned before, PMSE, program making special event services, used microphones, talkback systems and other things like that. Other countries have primary services in there as well.

That's a very quick rushed through the findings of the questionnaire that Working Party 6A did. All the details are in BT.2302 which is available for download from the ITU website. I will stop there and hand it over to Elena to talk about some of the other agenda items coming up at WRC. Elena, over to you.

>> ELENA PUIGREFAGUT: Thank you very much, David, and thank you to Jaroslaw to invite us to participate in this important event. We are happy to be here, so as David explained, he has focused on -- he has focused on the challenges that we will have in Europe regarding terrestrial spectrum and regarding the terrestrial television platform. I'm going to give you a very quick overview of all the challenges as we may have and in this case, it's focusing on satellite broadcasting because for broadcasters, the satellite platforms are also very important tourism our audiences, and also for contributions links and to create our content.

So very quickly, this is the EBU due to the time pressure, aisle not explain that and go directly to the -- to the important agenda items that will be discussed at the next conference and that is also for concern for broadcasters. And this is agenda item 1.2 that considers the identification of frequency bands for IMT. There are different frequency bands and it will defer from Region 1 to Region 2. We can see that we have part of the uplink of the C band that will be affected in Region 1, that includes Europe. This is the 6,425 megahertz to 7,025 megahertz. Thank God this is not highly used for television in Europe. But it's still a planned band for C band for the uplink for the television. And also here, we can see there's another important band, 7,025 to the 7,125 megahertz, this will

potentially be identified globally across all three regions in the ITU for IMT. And we use this for electronic news gathering. This is a very important band for many broadcasters to create their content for the important events like, for example, big sport events or whether it's a big news that we have to create the content, and transmit that live.

Another important agenda item is agenda item 1.3, which also will consider the potential identification for primary at primary level for mobile services in the 3.6 to 3.8 gigahertz band. This only affects Region 1. So it covers Europe. And this is part of the downlink of the C band.

And finally, agenda 9.1c, it does not require directions to the relations but it will study the potential use of IMT for fixed wireless broadband in certain frequency bands currently allocated to the fixed services on a primary basis. The issue for us could be the Ku-band that's a core band for DTH satellite services.

So both agenda items 1.2 and 1.3, we touch a little bit on the C band and what is the importance for C-band for us for broadcasters the C.-band offers extremely good performance in the case of rain attenuation and a large geographic region.

I was in a conference two days ago and a satellite operator said to cover the whole of Africa with C band, you can do it with one satellite. However, you try to cover the whole of Africa with Ku band, you seed four -- need four satellites. So there's a huge difference between frequency bands and C band provides extremely good geographic reach. There's differences of the use of the C band around the world and so as I said, in those places of the world, where there are more cases of high rain fades, this event is more used than in other parts the world.

However, the band is essential for EBU members for the distributions and those who distribute international services including BBC World Is service and for contribution for many special events include the Eurovision network and for services like Formula 1 or the Football World Cup and Olympic games, those are really important and rely highly on the C band.

We have highlight that the C band has to share the services with IMT services, 4G or 5G, and this is up to hundreds of kilometres to avoid interference to IMT and satellite services. There are many techniques we can put

guard bands and filters to the station and we can impose
certain restrictions to the out of band emission limits to
the IMT services, but in any case, it's difficult, very
difficult to share the band between IMT and satellite
services.

And also in addition for our case, we have many
received only satellite dishes all around the world, which
are not necessarily registered.

In that case, it's very difficult to claim protection
for this kind of reception modes.

So why the EBU. We have the three point band, for
mobile broadband and it's one the core pioneers bands at
the ex U level for 5G services. Many European countries
have already auctioned the band and the consequences that
satellite services had to stop because we couldn't share
the services with IMT.

So within Europe, due to that, we are moving our
service, our broadcasting satellite services to the upper
part of the C band which is 3.8 to 4.2 gigahertz. However,
there are already some European countries that have started
to look at this band, also for future uses, and in
particular, 5G usages. And also European Commission is in
the way to prepare a pan date to study the potential use of
the band for 5G services. So it's going to be also another
challenge for broadcasters that rely on C band for the TV
services. So we at the EBU level, we work constantly with
the satellite operators, of course, for them it's a
business case. And also we work with corporations with
internation regulations forum, to try to find solutions
wherever we can share because as I said, the use of this C
band is particular, is not everywhere and we may try to
find some solutions that fit together, to everybody.

And finally, the Ku band, the Ku band that moot be
under the cover the worldwide radio communications. This
is a television across Europe, and for all EU members and
the Eurovision, which also relies on the K U. band but in
Europe, mainly it relies a lot on the Ku band.

As the problems with the C band we have received only
satellite dishes in the Ku brand which are not registered
and, again, we cannot claim protection for those dishes and
they are very vulnerable to interference because they have
very small receivers.

Although the agenda item will not have a direct impact
on the regulations, it could carry a risk for the Ku band.
We are monitoring this for great care. So thank you very

much for listing to me. This presentation focused on the satellite challenges, in particular to frequency challenges. So thank you very much for listening to me and I pass on to you Jaroslaw.

>> JAROSLAW PONDER: Thank you very much, David and Elena and Sebastiano and Jenny. I think we have a nice idea of what is happening at the European level. And we have Andrew Kisaka, who with is the Tanzania Communications Regulatory Authority. He will join, as with his views on this, what is happening in Africa and this is something that's quite important, because we would like to make the ties to the future work and similar exchanges in Africa. So let us hear what are the similarities of what is happening in Europe and Africa.

Andrew, the floor is yours.

>> ANDREW KISAKA: Thank you, moderator. It's my pleasure to get this opportunity to share with you what is happening in East Africa, especially to the topic of this workshop, which is the future of television in Europe -- for Europe.

Now, I will share with you the trend of broadcasting, the trend of broadcasting in East African countries.

Starting with -- I will provide the background, where do we come? Because if we want to trust well the trend, I will start providing you where do we come in terms of television delivery and then broadcasting landscape in East Africa. And then I will talk about digital terrestrial television and what are the opportunities and the challenges we are facing.

First of all, my presentation will focus on five countries, which are members of what we call east African communication organization, well known as EACO. In EACO, we have a committee dealing with broadcasting matters and this committee has been very supportive, very instrumental which enabled the EACO Member States to migrate from analog terrestrial television to digital television.

Taking our background, you will find that mostly we are coming from analog terrestrial television. We need -- we need to have DTH and cable television, but it's there in a very small scale, and mostly, it was for pay television.

So to EACO, we were able to switch off analog and we moved to digital television, before 2025. Now, let me share with you that television broadcasting landscape. We have three types of television broadcasting content delivery. First, with he have DTT broadcast-based content

this is the main television delivery platform for EACO and it was fully operational as I said before, 2015, after switching off analog networks. But this had DTT, normally, it's -- (No audio).

>> JAROSLAW PONDER: We lost you.

>> STEFANO POLIDORI: I'm afraid that Andrew has a problem with connectivity.

>> JAROSLAW PONDER: Andrew, can you maybe switch off the camera.

>> ANDREW KISAKA: Hello.

>> JAROSLAW PONDER: Can you switch off the challenge. We lost one minute of your intervention, if you could come back.

>> ANDREW KISAKA: I switch off my camera.

>> JAROSLAW PONDER: Excellent. So let's go ahead.

>> ANDREW KISAKA: Okay.

The second delivery mode is Internet-based content. As I said, after digitalization of broadcasting networks, that media transmission paved the way to Internet best content. So we do have online television radio, TV, streaming video -- (No audio).

>> STEFANO POLIDORI: Jaroslaw, I think we lost again Andrew. It seems to be a problem with connectivity. Perhaps it would be better to go to the Q&A.

>> JAROSLAW PONDER: Andrew, we see that you are still there.

>> ANDREW KISAKA: I'm still there.

>> JAROSLAW PONDER: Yes so, we lost you, maybe switch off the camera because we can see that you are still broadcasting and maybe let's just --

>> ANDREW KISAKA: Let me switch off the camera.

>> JAROSLAW PONDER: Very good. If you could go ahead and complete the presentation. And guide our colleague to say which slide should be displayed.

>> ANDREW KISAKA: Okay. Okay.

Can you go next. Next. Next again. Next.

Okay I was talking about three type of television -- delivery modes, and now I will talk about receiver for digital broadcasting. We have our DTT and DTH decoders and as of March. We had 2,000,814, and we had DTT decoders, 1,000,471. So as I said, for cable, it's still in very small scale. We have almost 100,000 cable decoders and DTH, in this case, I'm talking DTH with -- like getting outside of country like Dstv, we have almost 250,000 decoders.

As I said, we do have Internet-based content and most of it the receivers are SmartPhone. So if you see, the penetration of the SmartPhone as of March '21, we only have 26% while the Internet penetration is 49%. We are saying that an average perpetration of SmartPhone in Sub-Saharan Africa is almost 30%. I have cited another example, Uganda's SmartPhone penetration as of 2021 is 16%.

So you find that Internet-based content is not that much larger because of the challenges of receiver. We also have smart television in which I cannot provide the number, but it's there, increasing slowly. We are seeing now a number of smart television receivers coming in the market and we have the users now accessing the smart television receiver. Next.

When we talk of number of viewers, I'm still in the broadcasting landscape. In Tanzania, one television receiver can be requested by a household which normally we estimate has four members of the family. So the estimate is, like I said, it's we have almost 13 million viewers for DTT, which is a big number compared with other platform. Next? Now let me focus on the main platform for television delivery. It's digital terrestrial television. Next, please.

The five countries in East Africa we have developed the value chain. We have Rwanda has two single distributor and Uganda has two and conditionia has five but two are common carrier and three are self-provision, and Tanzania, we have three signal distributor and Burundi has one signal distributor. And all with four multiplexes. This is how the value chain and the broadcasting value chain has been organized with content service provider and signal distributor as the key player in the broadcasting value chain with the end user who ultimately receives the content.

Yes, this is what I explain. The content service provider but the multiplex operator and the network provider is doing the work of signal distributor. We have a signal distributor who plays the role of the multiplex operator and the network provider. Next. Now the business model is like this. The content service provider role is content creation, production, packaging and distributing for carriers to the end user.

Source of revenue for content service provider is sales of air time and program sponsorship, and commercial advertisement. And pay-of, we have a content service

provider whose key role is content aggregation and to put it to the signal distribution. The source of revenue of the pay TV operator is subscription fees, sponsorship of commercial adverts and the live event.

The signal distributor, his role is to carry content services, provide television programs to the end user, and the source of revenue is transmission fees and subscription fees. Next.

The spectrum rights go through the signal distributor or the smart black. The broadcast rights go to the content provider and the operating rights go the to the multiplex operator and the device vendors. Next.

Now, let me discuss about opportunities. First, the opportunities that we have is content, diversity and pluralism. Through DTT, we have a lot of content. It has increased choice of content. Kenya has almost 80 FTA and approximately 140 pay television channels. So this, as I said before, increases the choice of content. Tanzania, we have almost 44 FT ax channels and 120 pay television channels on DTT.

Now another opportunity is to empower use through local subscription content. We have youth. Now they have an opportunity to create, to make their own film, by using local content. So they are creating movies, documentaries and other appealing local content and people now may subscript to the platform they way to access these channels and at the end these youth or artists, they get money out of it. So it's creating new source of revenue. We do have specialized content, sports, children, news and current affairs. We have local premium league now with a special channel. So this has been creating a lot of opportunity in content perspective.

>> JAROSLAW PONDER: Andrew, pay attention to time management, we have to wrap up.

>> ANDREW KISAKA: Okay. Online content. People -- we have realized multimedia such as online advertisement, and so esports and others.

Next.

The last slide is on challenges. Next.

On content service provider perspective, the business model is now in danger because the number of DTH has increased. And it's not increasing and remaining the same and so the sustainability of a business model, it's now at danger. It's now at risk.

In consumer perspective, the challenges we are getting

is the price of DTT recorders which has ranged from US dollar $30 to $35 and DTH ranges from US dollar $40 to $50. And the other thing is the interoperability of set top box, because the consumer would like to use one decoder, especially from when switching from one service provider to another.

Because we have a good number of content service provider, its content monitoring and regulating online media. I conclude next by saying, mainstream DTT and DTH and online media platform will still continue to compliment each other, and it will remain to be main means of television delivery in east Africa. The regulator should continue to develop and improve the regulatory environment to enable the growth of Internet-based content and the pay TV industry on DTT platform now is growing exponentially, competing with other platforms.

I can say I'm concluding by saying that I think DTT still will remain to be there, but will compliment to online media as online media is slowly increasing and penetrating to users. Thank you very much.

>> JAROSLAW PONDER: Thank you very much, Andrew and thank you very much all colleagues for your contributions. I got literally one minute for very quick question from each of you. Which I would like to ask after which we'll have to wrap up the session. But all attendees are invited to put their questions and interact with our speakers in the chatroom.

So Jenny, Sebastiano, David, Elena, Andrew, name one challenge which in your opinion should be prioritized in action in the coming six months in order to make sure that the future of television is full of innovation and technological innovation. So let's start with Jenny.

>> JENNY WEINAND: Thank you. I think the main challenge for the ex U is to rebalance and to -- to rebalance the relationship between economic-driven regulation, bearing in mind the fundamental rights and the cultural perspective.

>> JAROSLAW PONDER: Great. Thank you very much. Thank you very much, Jenny. Let's move to Sebastiano national perspective.

>> SEBASTIANO TRIGILA: If you say in the next six months, I would say success of the DTT transition.

>> JAROSLAW PONDER: Thank you.

>> SEBASTIANO TRIGILA: Once we have this done, then we can reason about living our co-quittance of DVB-1.

>> JAROSLAW PONDER: And now David and Elena.

>> DAVID JOHNSON: I would say recognition of the importance of ensuring sufficient spectrum for the near the add of DTT broadcasting in the face of other competition services.

>> ELENA PUIGREFAGUT: A think regulators will have to find a way to compromise and to find solutions for different services that want to access the same spectrum. Thank you.

>> JAROSLAW PONDER: Thank you. And let's move to regulator then. Andrew.

>> ANDREW KISAKA: Yes, on regulatory perspective, I can say there's a need to balance for the broadcasters. Thank you.

>> JAROSLAW PONDER: Distinguished speakers, distinguished panelists thank you very much for being with us and providing to all and the presentations. With this, we are closing this session, and it is my great pleasure to hand over the floor to Hans Hoffman who will be moderating the session two. Hans, the floor is yours. Thank you very much.

>> HANS HOFFMANN: Hello colleagues, let me check the audio S. it functioning. Welcome for coming to our session. My name is Hans Hoffman I'm from the EBU technology and innovation department in Geneva and I'm super happy to welcome you to the session where we discuss the future user experience for television. And I think you are all aware about this drastic and fast changes we are confronted with, and in our media industry and the media sector in general, and I'm super pleased to have a set of very, very impressive presenters with us today, who shared their vision and their view points on the future user experience for television.

Since we are running late, I will not do long introductions and bio readings of each the presenters. I think we go straight into the session and hand over, actually to our first presenter, I'm super proud to have her with us, Judy Parnall, a very familiar face to many of you so Judy is not only the senior figure within the BBC, but our technical chair with the EBU. I'm happy to talk about the future of the European user experience for television in Europe. Judy, are you with us and are you ready to run the show?

>> JUDY PARNALL: I am, thank you, Hans and good morning, good afternoon, and good evening to you all. I'm

thrilled to be able to come and share with you something of our vision.

This this has been developed by a number of organizationed within the EBU. Those would have the innovation departments and in particular, I would like to talk to you today about the future user experience.

I'm very much going to look from the point of view of the user. So you won't hear me using words like objects or delivery mechanisms but actually what do I see as a user? There's a lot of ways to get it to users but what do you want? Well, we know now that people want to watch TV on something like this, a pretty small screen. I'm amazed how much people can watch a big movie, on something as small as this. They are watching at home and on the move, live, downloaded streamed, as part of a channel. So what is actually people looking at in the future? I will look at two areas. One is personalization. And the second is immersion.

So first, greater personalization, and control. So we want to personalize the user experience. The might get suggestions on what they want to consume and what they might need and what they might like and things that you are trying to promote as a broadcaster but, you know, we are used to seeing that perhaps for something like YouTube, where you have been watching a video and that prompts you for the next one. How will that fit into the television market?

As we come to a more holistic, delivering broadcast and broadband delivery, that becomes more possible. And it might extend into activities being undertaken in the physical world. Actually how does this link through with extended reality, with virtual reality, actually, where are you?

What I want and when I'm sitting on a train and I don't particularly watch, but I certainly listen, I want to have a different experience, because I want to a lot of volume. I may want to have subtitles because I want to act in a different world. I want to continue and just get audio. So perhaps bring in some audio description for me.

But to be fully personalized, you actually need some knowledge of who you are. Is that a cookie or log-in. So how do people want to log-in? You might want to use facial or voice recognition. Passwords are rapidly going out of favor. But actually, it's who you are might be a better way to do this but, of course, we then have to think about

as broadcasters, particularly for us as public service broadcasters, what the security is, what the surveillance mechanisms, what is the whole regulation around that?

We are actually looking as well to delivering -- it's not only screens but people more and more are looking at digital assistance. We have those smart devices and the IoT devices, the smart speakers where it delivers the cars and you think they are all audio, what does that mean for television? How you are beginning to get the smart speakers having screens on them. The cars are having bigger and bigger screens but in the in you vehicles with their Android or Google automotive interfaces having bigger screens. Maybe just for the back seat at the moment, but that likely as we move towards driveless car in the medium to the longer term, perhaps there will be times when we actually are wanting to sit in our car and watch the TV, perhaps not. It feels a bit more like being on a train rather than actually having to pay attention to the road.

And discovery, we are not wanting to do that deep search. People are becoming much more used to a casual and natural language interaction. The voice and the dynamic responses from the user interface are traditional lackdown navigation. A whole lot is coming together and assistants are becoming more companion like. So the assistant might know that I'm basically hooked on cookery competitions, which I am.

So perhaps that will -- it will start to find some more -- even more usual ones for me other than bakeoffs and master chefs.

And then personalization is to the adaptive experiences. It's great to see that there's a sign language option for this webinar. But actually how do we bring that in more often?

It's very interesting the surveys in the UK, that show that people that are using subtitles aren't the older people. It's not those that are that hard of hearing but actually it's younger people are the biggest people who are taking up and using subtitles. And so more and more people are actually wanting it. Maybe it's because, again, they are in a noisy environment or they have got used to watching them. Or if someone is with a greater migration of people and movement.

Actually, if you are watching in a second language. I sometimes find it easier to read in French than to listen in French. It's becoming more and more important. So

there will be the automatic translation of sound using speech synthesis. And that will be the Avatars bringing in sign language. And we need to think about bringing in the audio descriptions. Well, how can we automate that for those who, as I said can't watch at that time. And these we all of course want to see this, reading at home and continuing to listen while cycle, perhaps AR and controls using speech, we'll be using gesture brain computer interfaces. They are all there. They are being used for interfaces. Why aren't we integrating them on TVs?

So that's one area.

So the second area that people want to look for is the greater sense of reality. Actually being there. There's the meta verse world, that's bringing us into a greater sense of reality that people are beginning to watch. So people might want to be able to experience worlds they have not yet experienced. I never managed to get to places in the world that I would love to go to. I have never gone to Antarctica and possibly a bit cold but I would love to be perhaps more immersed in seeing what it really is like there. I don't want to the hand band. Actually, they have integrated them into an eye glass device would sit better for those who are using glosses.

And portable 3D displays may be used as a second screen. They will be -- as they become more popular, broadcast in through the gaming world, and yes, the metaverse world, how to bring our content to them.

3D audio, it not only gives the idea of directionality, but also depth of field, is something you get if you got your setium for your surround speakers -- your set um for your surround speakers. I remember going to one of NHK's early demonstrations. It must have been London 2012 or the Olympics, sitting in the theaters feeling like I was in the middle of that ground because they have the 22 channel sound set up. It's amazing.

Again, we are looking at merging the physical and the virtual worlds. At the AR cloud, that use of augmented reality, that map of the world, overlaying on to the real world, we have got a lot of content that actually could do that really easilily. So virtual and real information, mining our archives, making content for it. Our going to an historical site. Let a's have a look -- let's have a look at the broadcaster to get more information about it. Back in the 1950s, we used to -- they used to tell tales of let's have smell-o-vision. Let's bring in those extra

senses, but actually, why not? I mean we see those in the gaming world, by bringing in the haptics, the touch senses. It is incredible!

But actually bringing in all of our senses and not just our sight and our hearing.

And there's now forms of content that will bring you into this world. Ultra HD bringing from you 4K and some parts of the world, 8K and possibly even into 16K you might think what is the point of 16K. The screen is there. It's next to your glasses. That viewing distance is tiny compared height so you are not seeing it quarter of an H away and the resolution to come to 16K, becomes pore important. Of course, there are the challenges of how to deliver that, but that's something that we need to look at. Extended reality services bringing in all of the option Oz that we have NKH has done some fantastic demos of what it means to be immersed and have Avatars with you.

The idea of watching together, a of building communities as you watch and to extended realities. And nest generation audio, we are already seeing that happen around immersive audio, but, again, building up perhaps a lot of devices coming together. You might have a a computer and a laptop, can you do that to consolidate your audio to make an immersive scenario. Those some are ideas that we have. It will be good to hear other people's perspectives. Thank you. And back to you, Hans.

>> HANS HOFFMANN: Excellent presentation and congratulations, Judy, for absolutely being in time of the presentation duration. You have set really the bar very high for our follow-up speakers. The way, how I would like to run, it actually is please hold your ideas for questions. We run through the presentation and then have a short debate all together then. So moving on is my colleague Sebastian Noir. He's the head of our software engineering team, and Sebastian is going to talk about the future interactive user experience for television in Europe. Sebastian, you have the floor.

>> SEBASTIEN NOIR: Thank you, Hans and good morning, everyone. So if we are talking about the future for interactive user experience, maybe the key question to ask is what do we mean by TV first of all. Maybe in your mind you have enviewed something like that, two people in front of a traditional TV, watching a traditional TV channel.

But you could also argue that maybe nowadays TV feels more like that. So someone in front of NetFlix and well,

is that still TV? Probably could you argue, yes, it is because well, we have shows on the screen, and it's on a big TV screen. So that's obviously TV.

But then if we move a bit further. Is that NetFlix if you are watching on your phone? That must be TV, right?

But if it is in your car then that you are watching NetFlix or anyone anywhere else, and any other kind of device New York matter whether it's the place or the timeS. that still TV? Because well, it's the same content, you know.

And obviously, it's not just NetFlix playing this game, but basically all of them, all the big players are there from -- coming from the net, are doing the same thing whether we are talking about Amazon prime, about hue low, Google, Disney plus, or apple TV, they are all now competing with the traditional TV channels right on the same TV screens and any other devices that the users may want to use.

And the borders are getting even more blurry as we speak here because if we have a look, for example, at this apple TV device, we can see that it's knot just TV. You can do many different things there on your TV screen. You can obviously rent and buy a different series and films to watch. You can install apps to have even access to more services like the NetFlix, Amazon Prime and others. You can use it as a receiver for your phone while you may have content coming from any kind of source, including from traditional broadcaster and that can beam that to your big screen.

Or maybe you want to be more active and in that case you want to do some fitness in front of your TV and through the help of your Apple watch, you can track that or play some games or listen to music or play content that you will be watching with others like friends and family, for example, which they are in the room in some other places while talking about the home, maybe you want to control the way your home is set um at the moment and see what you can see from your cameras, change the temperature or anything else you may have on your mind, all of this from your TV screen. This is not limited to this specific device. You may have a similar experience using broadcasts from other manufacturers and even just the Apple TV app would be available on any device that you think of, whether it's the big TVs from major TVs like Samsung, play station, and more. It really gets blurry here what we mean by

television.

So maybe you will see well, it's very easy. Real TV, wile it's all about production, it's creating the best possible content. What matters is the quality of the production and if we have the best studio in town or in the country, then, yes, we are doing real TV. And all the things that we have mentioned just before, by Judy having more resolution, more frames, more dynamic range, more audio, and more audio channels and being more immersive are all the characteristics that make for great TV and will make better TV than the future.

Why not?

And then well, if you have a look at what YouTube is doing here again, we can see that it also creates different studios at a time they had ten locations worldwide. They started doing that in 2012 already. And they are providing those locations for their most influential content producers as a way also to train them, help them create more content and content of better quality, so anyway, they are doing TV right. If you have time, you can see a video maybe later from the slides, we will keep it short for now.

So where are we now in everyone is doing TV and everyone is not just everyone as a company, but it's also everyone as a person to some extent, and I think the pandemic has shown quite clearly it wassan accelerator for the way content is created and broadcasters had to move from day to night and overnight turning their production facilities to do that remotely. We have seen YouTubeers getting even more success as people were staying indoors and they didn't wait for us to create their own studios. Everyone can have a studio. You can create your own setup and start to broadcast in live or not in live to the world very easily. We have seen that as well for typical events that used to be in person and that have transitions to be done in hybrid mode or even fully virtual, like the one we are having today. All of this is in a way we could argue still TV.

At the same time, we can see that traditional TV is under pressure while the content -- the time enter sympathy by users watching content is quite high, at the moment and even in some countries is rising because of the COVID crisis and the need to stay informed. We can also see that the younger generations, while it doesn't work that well, they are still in connection with the TV. They are still using that to access the news, for example, or 9 kind of

material, but at the same time, the time they spend on the TV versus on the other screens is kind of diminishing, and that's obviously a concern for our ability to reach out to those younger generations.

Well, if you were to ask my kids if they love to have screen time. They say, yes we love screen time and that's one the worst things you can do to is to limit the screen time. Obviously you have to do that at some point. Why are they using the screen time? Well, obviously to do games or to watch YouTube videos about games again or to learn new things and tricks following tutorials or whatever else. And they love to use NetFlix. That doesn't mean that they are not going to the traditional broadcast TV but they will probably do so only for live sports and the news. That's the main usage that they will have for those TVs but that remains a little portion of the time they will spend on their own screens.

So what does it mean in the end? Well, it means that we are all competing for the viewing time of the users there. And even the users if they are spending more and more time in front of their multiple screens that they have, it's not so easy to to be seen and have our content visible to those different users. So it's really a competition, and probably the fact that as you have seen in the recent news, Facebook algorithm are driven mostly by the capability to bring attention or to retain the attention of the users is not there by accident.

So we can ask this question well, what does the user perceive? I would tend to argue that what users are seeing nowadays is really apps. We have apps everywhere. We have apps obviously on the TV screen, for smart TVs. We have apps on the phone. We have apps on the be tablets. We have apps even on our watch and it doesn't stop there. If we go to the automotive industry, obviously we have apps there and the automotive OS that is taking on mark at the moment, you will have apps and you will be present in those specific cars only if your content is visible in an app that people will be able to find.

And there we can also see that the number of screens rising. We were mentioned by the car manufacturer that they were thinking of having as many as 1 screens on their own cars. So obviously that would be screens in the front of the car also at the back of the car, for specific users in the back. But why do we have so many screens? You could argue well, maybe because the users will have to

spend their time also in front of the screens while they
are charging their EVs or while they are driving or even
while they are not driving because the car will be driving
by itself. And then what do we want to have on those
screens? This is a question that we would have as
broadcasters as much as the request he is present for the
manufacturers because they need to keep the people happy in
the car. This is a new living room to some extent. This
is the place where you may have the best audio that you
could enjoy because you have so many speakers.

What is next then? Well, the current trend will
continue. We will still have higher resolution, more
frames and better quality and so on, but most likely the
apps are there to stay and your content must be in those
specific application in you want your user to have access
to your content on a daily basis. And to do that it's not
an easy game. They are competing with the apps of major
providers coming from the nets, the big GFAM and they have
lots of money to be created and they will have a great user
experience. And if you want to compete, you have to have
apps that will delever a similar kind of experience,
otherwise, the users will just move to those ones.

And obviously users will have multiple devices. You
have to find a way to drive them -- the content on specific
apps that you would own on all of these devices and this is
not so easy to do. Yes, let's move a little bit further.
If we are looking at what the digital shift may mean for us
as traditional broadcasters, where everything was basically
linear and time based, where westerly having this focus on
the channel or on the brand, where we deliver the same
content to all, we have to transition to this digital world
that is ail fact and users are experiencing because of the
social network or the big players are there. We have to
see what is happening there. We can see that the mood or
the culture is very different. It's all about being user
centric and my play list and things that matter for me.

So it's really a big shift that we have no do and we
have to do it on all of those different devices in a way
that would be consistent so that I will feel at home no
matter where I am, no matter what is the device that I'm
using. It must be my universe.

So it's really a big shift for us as broadcasters.

And this shift is all about data, because we could
argue TV is just another app amongst the many that exist
out there in the field. So broadcasters will have to

change and become media driven and be able to become those media, data or net companies if you wish and actually define the best way to name those. We have to serve the audience in a better way. You could argue, well, this is maybe not what we want to do, but this is what you will have to do if you want to stay relevant, because without this, the users will feel that they are in a world and they would prefer to be in a world where they find their stuff more easily and for that, you obviously need some kind of log-in or any kind of authorization because you want to follow the different users across the different devices and you cannot afford to use the precious connection that you are creating with your audience in case they will lose their phone or if they are moving to a different kind of device or brand.

So you must retain this precious user experience that you are creating for each and every one of them.

This a way personalization and recommendations in terms of content is now the norm among all the digital platforms and we have to adapt to that and be able to deliver it to our users as well. Being relevant, being appealing is absolutely key and maybe the rise of platforms like TikTok, where you can quickly get content without any kind of interactions or any kind of selections. You just dive in there and stay there is a good indication that we are going in this direction.

>> HANS HOFFMANN: You have time, Sebastian.

>> SEBASTIEN NOIR: It's about having the interactive user experience where TV is more than just watching a video. It's about making it personal and making it interactive and metaverse, where you are in your living room or somewhere where it's not easily to be immersed in different reality. You want the users to be in control and be in control of basically everything.

I will end by saying that technology plays a huge role but we should not get why we have technology. Technology is a way to basically be the medium between different people and we should be basically work to help people connect to each other, whether this is like having direct connections with the people, while we are watching content, but I would say more profoundly, this is about being able to tell those given stories, bringing the real human stories from one place in Europe to another place in Europe and show that we are part of the same community. And rise that we have now is automatic translation in my view is

where we can bring new content and help people understand
different realities and I would say this is very important
to be done at the moment. Thank you. Over to you, Hans.
     >> HANS HOFFMANN: Thank you, Sebastian and once more
appreciated that you are stayed in time. Very interesting
considerations from you. Dear colleagues here on the call,
please -- please save your questions for our big debate at
the end.
     We immediately considerations and look at
accessibility for television in Europe and pillar Orero and
Pradipta Biswas will introduce the topic to us. Pilar are
you ready to go?
     >> PILAR ORERO: I am ready to go. Thank you very much
for inviting me. What I would like to talk about,
actually, it fits very well with what Judy was saying and
Sebastian was saying and it will lead to Pradipta. My
issue is accessibility. Media accessibility. Judy told us
about all the items in the new television. Would you
present?
     >> HANS HOFFMANN: I think you were supposed to present
it.
     >> STEFANO POLIDORI: Pilar, we have not received your
lis.
     >> PILAR ORERO: I sent them last week.
     >> STEFANO POLIDORI: We didn't receive that. Anyway,
I think you can do that. You just go in slide mode.
     >> PILAR ORERO: Did that work?
     >> STEFANO POLIDORI: Yes, we see that. Please go
ahead.
     >> PILAR ORERO: Okay. The issue for me is just two
issues. The first is how is European broadcasters going to
point or going to signal the accessibility services that
they offer? And that is a problem because if you look at
the bottom of your screen right now, you see that you have
a button that says CC. That's closed captions. And it
also at the bottom of the closes captions it says live
transcript. This is what in Europe we call subtitling in
English, but in each European country we have a different
name.
     So to use the symbol CC for closed captions does not
help neither for the European languages, not for the
European alphabets. If you look at the different -- the
three different at least, writing systems in Europe. So we
have cyrilliy and Latin and we also have Greek. So in
Greek, and cyrillic, they do not share the CC or the AD,

for example that we have.

So to me, I think one very, very basic issue that we need to solve straightaway in order to offer accessibility services for Europe and all the Europeans as Sebastian said is to agree on symbols to point what are the services and also the interaction to -- to be able to offer the services, because one thing is that the services are there and the other thing is that you have the symbols there and other way is how to access the symbols.

If you have audiodescription you would need symbol to be in an audio way. Because a blind person would not be able to see the audio description. So, again, it would not be an icon, but an ear con, what would be needed here.

And -- but Judy explained the myriad of possibilities we have for interaction these days. So I think that should be quite simple.

And ITU, perhaps is a great place to come and standardize accessibility services because it's not just for Europe. It would be fantastic if it is for the whole world, since we -- each country more or less they have different languages in it. So that's my first point. My second point, this is, for example, a solution that was offered by the Danish public broadcaster, DR, and what they used to create their accessibility symbols was the keyboards. So they are free to be used, and also you can very easily produce them with standard quality by using your keyboard. So that is a great solution. That's -- you can tell that there is a possibility to generate symbol for all the accessibility services.

The next thing I would like to share with you -- I don't know if I will be able to. It's not going to work. It's not going to work. I wanted to share -- yes.

>> HANS HOFFMANN: It works. We can see it and hear it.

>> PILAR ORERO: Okay. This is very much what Sebastian was saying. The consumer has become a prosumer and the prosumer would be able to broadcast their content what is interesting for us is that what we are researching at the moment, is the possibility of the consumer also producing in a remote way the accessibility services and to be able -- them to be able to put through blockchain, to mark would is the owner of this accessibility services and sell the accessibility services across Europe. And that would be a very rational -- definitely a different business model to what we have at the moment for accessibility

services. So the possibility of the consumer from the
remote location to be able to offer an retain the copyright
and retain the possibility of monetizing this work I think
that would also open up the possibilities of accessibility
in all the different languages we have in Europe. And that
was my presentation. Thank you very much.
     >> HANS HOFFMANN: Thank you very much, Pilar. Should
we seamless move on to to Pradipta's presentation?
     >> PRADIPTA BISWAS: I hope I am audible.
     >> HANS HOFFMANN: Yes, I can hear you very well.
     >> PRADIPTA BISWAS: Right good afternoon. I hope my
slides are visible. I will just follow-up the present
discussion on interaction and personalization with recent
effort that ITU about setting up a new draft recommendation
on common user profile.
     Myself, I'm Pradipta Biswas, I'm a professor at Robert
Bosch center for cyber physical systems. It's to create a
seamless profile that can be transported across multiple
device and applications as we have already seen that the
old concept of linear action is no longer true and now
consumers becomes producer and producer becomes prosumer
and a lot of interest action is possible in broadcast TV.
     But the present issue is every time someone is using a
device, forget about people with different range of
abilities even when you are using a SmartPhone sitting at
your desk, compared to using the same SmartPhone when you
are walking down the street, try to send an SMS and when
you are using the virtual keyboard, it will find the
difficulty we face and the -- every time we have configured
something in a device or in an application, that we have to
do multiple times and even such application for
configuration is not many accessible.
     So that work of common user profile format is offering
up earlier similar work at standardization agencies in the
early focus group at ITU, and recently, it's being
addressed by at Study Group 9 and question 26 at study
group 16, and input from Study Group 6.
     The approach is to create minimum profiles and here
the most important part of this effort is the agreement or
some sort of understanding of among many producers. Why
Thas not been done before, although -- why it has not been
done before, although we agree about the flood for user
profile or personalization, but it couldn't have been done
or doesn't exist still now, because the device or the
diverse applications each has their own limitations and

that the user requirements are disverse and it was confined
to a certain groups. So the effort is to agree on a
correspond set of minimal -- common set of minimal
standards. Of course it can be extended for specific
applications or to address the needs of particular types of
users which you may not be sufficient within this common
set of variables, but an agreement among different
stakeholders will be useful to personalize. The a big
question is the security aspects. It specifically doesn't
intend to store any personal or any demographic information
about user and it conforms to existing EU and other
legislation on that. And it's been left to the particular
person who is implementing that.

     Here's some way we always explode similar common
profile to implement that we can execute a mapping function
where it will translate the common user profile to specific
application level instruction in terms of contrast,
et cetera, or it can be executed and applied to the machine
and we developed Android app which I will show you in the
next slide.

     Where the whole user profile will go out from the
client's device. So you will have the user profile and it
will not be shared with other. If we can agree on the
format what data we have to store and what will be the
format on the data, then these information can be exchanged
as and when necessary without compromising user security.

     These some are examples. Of course, we can talk in
further detail after the session ends that on the left side
you can see the -- (Garbled audio) the content is different
based on the user profile and on the right-hand side, the
aim user profile, it's rendered differently for the Android
app. And again, how the user profile will be utilized that
has been left to the application developers will all we are
trying to reach agreement on the state of barriers and a
way to format.

     And the same user profile, so still now a big problem
with the content developers, they have -- they may not
realize the need of people with a different range of
abilities and although we should always connect to
organization representing various persons with different
types of abilities but if practice that does not happen
until now for various reasons. We are trying to change the
situation, but similar to help we can provide at the early
design changes or to young designers is showing them our
particular type of color blindness will look at a user

interface or how a person with that particular type of
visual impairment will perceive the interface and the color
contrasts and fonts are good enough and similar how a
person with tremoring hand will move a curse or or pointer
on screen when he's trying to select a button. So it can
for a user interaction to visualize issues faced by people
with different range of abilities.
    So to conclude the whole effort is to reduce the
digital divide. It's often not visible to develop the same
application for the different range of abilities rather
it's more easier to adapt it. And sharing personalized
information with an overall aim to coniform to the UN CRPD.
So I acknowledge my colleagues and my funding agencies and
you can see a small snapshot from my existing lab.
    With that I will stop talking and we will look forward
to the discussion after session. Thank you.
    >> HANS HOFFMANN: Thank you very much. Thank you.
    Excellent presentation. Thank you for introducing our
work to us.
    Our last presenter is Luiz and he will talk about the
protect TV 3.0, a case study in Brazil.
    Luisz, are you ready?
    >> LUIZ FAUSTO SOUZA BRITO: Yes do you hear me?
    >> HANS HOFFMANN: We see the PowerPoint.
    >> LUIZ FAUSTO SOUZA BRITO: That's great.
    >> HANS HOFFMANN: Still no PowerPoint.
    >> LUIZ FAUSTO SOUZA BRITO: Just again. Let's try
again.
    Can you see my screen right now?
    >> HANS HOFFMANN: Yes.
    >> LUIZ FAUSTO SOUZA BRITO: Great. Thanks.
    So good morning, good afternoon, and good evening,
everyone, depending on where you are. In Rio, Brazil, it's
still very early in the morning, I'm Luiz Fausto, with the
SBTVD forum. I'm here to share what we are working on
regarding future user experience for television in a
different part of the world, in Brazil.
    I will think it may be appropriate to contextualize a
little bit how different it is. Brazil has a huge
territorial area, 8.5 million square kilometers about twice
the area of the European Union, with more than 210 million
inhabitants. About one half of the European Union
population.
    There's a few dozen of high density population areas
such as a metropolitan area that has more than 20 million

inhabitants. And huge areas where much lower population
density. And although there are many regional differences
across the country, we all speak the same language,
Brazilian Portuguese with different regional accents. We
all can understand each other. And television, in
particular, has been very instrumental in the national and
cultural integration in the last seven decades.

In this slide, we can see the pervasiveness of the
different TV distribution platforms in Brazil. You can see
that they add up to more than 100% because many households
have more than one television access platform. You can see
that free terrestrial broadcasting is the main TV
distribution platform in Brazil. Brazil completed the
terrestrial digital switchover, in all metropolitan areas,
and it's completing it in the country side by 2023.
Currently, digital terrestrial television shares more than
80% of the terrestrial television and it's growing every
year.

The overall terrestrial television share is also
increasing. Some areas in Brazil also have more than 40
different free-to-air television on TVD. There's no
broadcast network operators in Brazil. Each broadcaster
owns and operates its transmission infrastructure. Some TV
networks have more than 120 different regional programmings
across the country. So just to give you an overall picture
of how television in Brazil.

And so now, we look at terrestrial TV evolution in
Brazil and the terminology we use here just to
contextualize. TV started in Brazil in 1950 and we call
that TV 1.0. It was analog and black and white. And in
the 1970s we started broadcasting with color. That's what
we call TV 1.5 because it was backwards compatible with
1.0. And then no backward compatible evolution that was --
that's what we call 2.0, for that Brazil adopted, ISDTV,
originally adopted from Japan. We have have a Brazilian
interactive middle ware e call Jinga. We started operating
HDTV with high definition, mobile reception and
interactivity.

Then we started working on some backwards compatible
evolution a project that we call TV 2.5, and the receivers
are available in the Brazilian market for this new
standard. It adds new optional functionalities to the
system and it's backwards compatible and you can broadcast
HDR and immersetive audio IBB, which is DTV Play which is
an evolution of Jinga.

And then we are working on the next generation DTT system for Brazil, a project that we call TV 3.0, that's the focus of this presentation. On the main user experience requirement for this project. So first of all, we need to -- we want to change the idea of having channels to having apps. So instead of having let's say channel number 4, number 5, number 6, you would have different apps for different broadcasters. That's pretty much the user experience that users are moving towards nowadays.

So this app will manage all the presentation of all audio visual content regardless whether it's coming over the air or over the Internet or whatever other means can be.

We want the content, the audio visual content to be immersetive and customizable. It's very important that the content can adapt to user preferences to the user environment, to the geographical location, to the different ranges of ability and that this content is available and to the device the user is using and that it can be used in any device at any time.

It's also important to have seamless and transparent tagrags between linear and nonlinear, for personalized content. And this integration as I said needs to be seamless experience for the user. And these popular live event transmissions should not be limited by network congestion. That means it should not use unicast distribution. Frequently the popular TV it exits 100 million simultaneous users that would not be feasible through unicast anywhere in the world, regard of the existing broadband and CDN infrastructure.

We need the content to be relevant to the geographic location of the user to his state, to his city, to his neighborhood. So we need this linear content to be geographically segment as much as possible. And this there is a particular need to have indoor antenna reception. And for those requirements, we are using. We are working in a new concept of having a frequency to have a very robust transition. In a way that we can reuse the same channel in all stations to transmit the same content to indoor fixed reception and outdoor mobile reception, and we can segment the coverage in very flexible manner.

So these are the main user requirements for this new project TV 3.0 and I'm very thankful for your attention. And I'm available to answer any questions that you might have.

Thank you very much.

>> HANS HOFFMANN: Thank you, Luiz. Excellent presentation. We have a bit of time, thanks to the fact that you all have been very good in time for Q&As. I will have later on a general request to you. You can already start thinking about my general question to each of the panelists will be what can ITU do as a next concrete task? What tasks do you see for ITU coming out of the domains that you have represented? But before we go to any overall question to each of you, I have seen some in the chat box there.

Was one question about 5G, which now has disappeared. Okay? This is okay. But then we have another question which is what system do you have in place to make sure that representatives of person with disabilities are consulted and actively involved in planning of your access services?

So I think this is a question which goes to our accessibility specialists. Pilar, do you want to give it a try to answer this question, perhaps first?

Pilar and Pradipta,.

>> STEFANO POLIDORI: Do not forget to unmute yourself.

>> PRADIPTA BISWAS: Yes, I think presently, we use user-centered design, sometimes called participatory design, et cetera, which encourages to involve end users from the beginning of any design and development and also some also research journals, they will make it mandatory that they will not accept work that is not tested real end users. So this is more on the research community side, which I represent. On the commercial side, this is a painpoint that many times due to time and research constraint, its notable and the bigger problem is it's many I personal opinion that many times these opinions get polarized by a small sample of users.

Say, for example when we do a clinical trial for our laboratory, with he take relatively big samples when considering all the statistically phenomenon that has been realized. But then when we are designing up a product for people with disabilities, there are two do you remember side. Many times it's not evaluated with end user. That should not be. And many times it's a small subset of users and it doesn't represent the whole population so if I make something for a motor impaired user, because motor impairment can have multiple -- all motor-impaired cripples are not the same. So using an established scientific technique for sampling and connecting with the

representatives of the defined disable or organization, it should be mandatory, and it's also I think outcome of the standardization and legislative agencies, it will enforce that it's not only just tested with one or two users or the testing is not in the form of collection but it follows the same rigor for any other technology, which is developed for general audience.

>> HANS HOFFMANN: Yes.

>> PRADIPTA BISWAS: That was my answer.

>> HANS HOFFMANN: So colleagues don't forget to post your questions also in the chat boxes if you want.

I would like to come back to each of my presenters about what concrete tasks do you see for the ITU? Perhaps we start with Judy. Judy, you have looked into immersive media and user experience. You have mentioned eword that goes around at the moment, metaverse and do you see any concrete tasks in the ITU that we could look at or should look at?

>> JUDY PARNALL: One the things that I have been thinking about is we have done a lot of standards that underpin the next generation audio. So for the metadata standards that win -- that underpin that. But actually, it's much wider. So how can we extend those to be across all media forms and we can have more interaction and more personalization across all formats.

>> HANS HOFFMANN: Good point.

>> Object-based work.

>> JUDY PARNALL: We need that for the delivery of of this personalization to work on the breadth.

>> HANS HOFFMANN: Yep. Yep. And do you see already some concrete inputs being designed in terms of questions and what we could ask?

>> JUDY PARNALL: I think there's a lot of concrete head scratching going on.

>> HANS HOFFMANN: Concrete head scratching.

>> JUDY PARNALL: There's a lot of thinking about what can we do to make this from a bit of a world with lots of different versions that will make it very difficult for people to use, where if you end up with a lot of proprietary versions, actually to -- what do we need it make it more standard.

>> HANS HOFFMANN: And I think proprietary systems have never served the economy at the end. You are right. Si bastian, you mentioned in your -- Sebastian, you mentioned in your presentation that data is the new gold and it's all

data what could be concrete work questions that the ITU-R and the ITU could address?

>> SEBASTIEN NOIR: Well, I think data plays a major role of this being the digital shift and anything that can be done to accelerate this transition is helpful. It's about specific standards about the data itself and data coming from the users, the collection that may happen in the different apps or different experiences along there. This is one option, but also you have to do something with the data that you create and you have to move to this app world that we were discussing just moments ago and for that, it's all about software and software, and data obviously work well together. So anything that the ITU here that would be concrete, not just papers and standardization but concrete software that can help the different people that can integrate their own products to create their own products more easily at a better scale or even let's say hopefully join forces that will have the prominence needed so the users can find them in any kind of device. I think this would be very useful.

Standards, yes, that would be applied in a concrete world. You have a chance for adoption that would be my suggestion.

>> HANS HOFFMANN: Thank you, Sebastian. So moving away from paper to software is utmost important because this allows us to apply tests, trial and get fast onboarding of new technologies. I do agree. I do agree.

Pilar, what is your point of view? I know accessibility is high on the agenda. Do you see since you introduced the EU project, which is almost an acronym for the industry. Do you see concrete items?

>> PILAR ORERO: The most concrete action to me is very clear and that's the creation of symbols or icons for accessibility services and also for the objects. If you are going to go for audio objects as Judy which I think is brilliant, we also need to have icons so people can equalize -- equalize their audio to have a clean audio. Whether it's a slider but that sort of interaction to me is to point to what service goes for what eye gone. That could be across the world. That would be phenomenal. And the intinction in the media player.

>> HANS HOFFMANN: That's an excellent recommendation for work. Thank you for being so precise. Pratima, you have introduced the -- Pradipta, you have brought you to us the correspond user profile. How do you see the acceptance

in the industry?

>> PRADIPTA BISWAS: Well so far everyone agrees that it's needed, but still now, it's it's kind of an ongoing process of agreement and how much it felts with the existing -- that -- the content production pipeline, because if it requires major overhaul probably in the cost benefit analysis come into quotient. If it can fit with the existing process, which is already in place, and also it's important that already similar guidelines exists for wave contents and broadcast TV and so on. But considering the present interaction -- situation as the previous presenters saying that their boundary is getting blurred, this is true for various applications and domains and then it will be easier for industry to adopt, and of course, that will make it more acceptable.

>> HANS HOFFMANN: Thank you. Thank you.

And now our last presenter, Luiz, what is your view point? What should ITU be looking at the future?

>> LUIZ FAUSTO SOUZA BRITO: The ITU has been working on the evolution of the television.

>> HANS HOFFMANN: Right.

>> LUIZ FAUSTO SOUZA BRITO: For many, many years and even decades. So it's -- it's always been working on that and it's continuous working on that. I would just refer you to an interesting new study studying ITU-R Study Group 6 is on the development of a vision, a correspond vision for the future of broadcasting as a whole.

So -- a common vision for future broadcasting as a whole. So to put a high level objectives for the future, there may be some let's say, universal objectives that we can agree upon, there may be some regional variations among this what are our goals with the future evolution of broadcasting, but in any case, its good to have, let's say a more high level discussion, not only in the details that we are implementing every day and developing every day in ITU, but also to, have let's say, guideline and common goal for us to develop within ITU.

>> HANS HOFFMANN: So this is great work, actually. I think colleagues we need to wrap up because of time. I would like first of all to thank all our presenters, Judy, Sebastian, Pilar Pradipta and Luiz for they'ring is their thoughts and staying in time and also for your willingness in the Q&As. So colleagues, online, I would suggest if you have further questions post then and afterwards our colleagues can help to answer them.

With this back to our chairman.
    >> STEFANO POLIDORI: Thank you very much, Mr. Hoffman,
and we starred well today thanks to the expert
distributions of our panelists and moderators. We have 250
participants today. That's great. Thank you all for
joining. Even if we are running a bit behind schedule, we
will keep our planned five-minute break. Kindly be back
at 11:35 Geneva time thank you.
    (break).
    >> Recording in progress.
    >> STEFANO POLIDORI: We are back. The future of the
meeting for Europe. And the next section is very
interesting. In fact, we are going to go to future content
creation for television. With the moderator is Susanne
Rath. Ms. Rath, the floor is yours.
    >> SUSANNE RATH: Hello, everybody. Thank you very
much. Yes, I welcome you to our session three, the future
content creation for television. What is probably one of
the main aspects of television, content creation. As my
former colleagues from the other sessions, we will have --
we have our three speakers and I will collect the questions
from the chat. Please place your questions in the chat and
then we will do a short question-and-answer in the end.
    So I welcome very heartily our three speakers.
Khishigbayar Dushchuluun from the German broadcasters AID
and Andy Quested and Ievgen Colin Powell kostiiukevych.
Khishigbayar Dushchuluun works many standardization panels
she will tell us about 5G campus networks. The floor is
yours.
    >> KISHIGBAYAR DUSHCHULUUN: Thank you, Susanne, it's
my great pleasure to be here. My name is Khishigbayar
Dushchuluun. I'm ISD, the association of public
broadcasting cooperations in the republic of Germany.
    So the 5G for TV production, broadcasters are
expecting from 5G. That's the Next Generation of wireless
technology, it offers latest in connectivity: It drives
every aspect of our life and the broadcasters hope that 5G
can be also used to technical and operational deficiency
and reduce production costs, so improve the low latency
rate and also we hope to -- the 5G can enable the new
production of workflows, particularly in remote production,
and also coverage of live events. Also it's very important
how we engage our users, the user engagement of the
important aspect.
    In order to realize all of these is specific and the

other content production requirements need to be identified
that must be met in 5G context.

So 5G campus network, I'm going to talk about today
how we can use this for production site. 5G campus network
is a local network which covers in small geographical area,
which can range from a few hundred kilometers out of. It
gives us the access only to people, devices, cameras that
if related with the campus so that it includes security.
It also allows the only campus network to configure their
own network. This is according -- to own it. For example,
the network can be changed for the shortest possible
latency optimal for live transmissions, for example, so you
can run live image, picture and some signals from cam --
cameras over your own network. You can transmit its useful
signals wirelessly. If you connect the device to your 5G
modem or install there.

That's why the campus network is very fast, powerful
by this network, but only those users who can also have the
suitable sim card can access it. It's independent from
public network providers.

So the -- now we think if we just set um the 5G campus
network, how does -- how much does it cost? What are --
you imagine how -- what is the cost would be. The 5G
campus network is subject through the federal network
agencies responsible for this. And it also charges the
fee. If -- also on the other hand you want to set up a
regional limited 5G network to cover this or the company
side, it's much cheaper. And, for example, here you see
the license fee that's in Germany, -- you see the situation
in Germany, they have the two different frequency ranges
for campus network allocated and also given to the
companies and draw two different formulas. You see one
square kilometer and it's around 400 to 500 Euros. And any
medium sized company can easily afford this. And also you
need to think additionally how -- how much cost and code
distributors and cables and this cost fee compromised those
parameters. In this frequency range, you have 10 megahertz
for ax us Clive use. And you can use it for a maximum term
of ten years and it's just a breakdown in two categories
A1, a2, it depends where your premises is there.

So -- and -- yeah, as I -- as I mentioned now, the
frequency range of 3.7 to 3.8 gigahertz, a total of
10 megahertz bandwidth, it will label what can be applied
with an increment of 10 megahertz black size for a maximum
of ten years with January of this year and the frequency

allocation for local broadband frequency usage. You see
24.25 to 27.5 gigahertz, a totally additional bandwidth of
3,250 megahertz. It's labeled for the private use. And
it's limited to bandwidth, but the bandwidth will be less
or equal to 800 megahertz based on the currently available
device parameters.

Now, since that, as of October of this year, a total
of 150 applications for this allocation of frequencies for
metrics have been submitted and they have been guaranteed
by network. On the right side you see the map of the
Germany and I'm going to talk -- give you today two
projects results or the project situation what in Germany,
for example, southern Munich, you have the Bayerischer
Roundfunk and this is public broadcasters and I will talk
about the media broadcast.

It will -- it's justed in Berlin.

So the media broadcast demonstrated what 5G campus
network can do for media production. It transmits -- it
can transmit four camera signals in the use case, a
proficient HD camera you see on the left side was connected
through HD to SDI to the new transmission unit from LiveU a
total after four cameras are connected to this unit and it
allows your production with up to four completely
synchronized feeds to be transmitted in H D. and 4K
quality. And it's also very convenient transparted in a
backpack. You equip it with -- you need to transmit the
camera signal into the standard campus network that
operates in -- as I said in Berlin, and through the
Internet media broadcasts also transmit the company's own
development sites in Berlin, where they have the video
server. And then it's labeled through this interface for
further processing.

So what I'm going to say here the media broadcast has
also showed and improved the whole thing works in
principle.

Of course, of course, there are limits. It's limited
to 378.8 gigahertz. If you want several cameras in the
same network, then you have to think how is it possible
with the bandwidth. Maybe you set up the server campus
networks in different zones, for example, at larger events
such as sports events or car races.

And what here I will give you what they -- as called
the 5G Blue Box. It's with 3GPP and there's the 5G core
network, the open 5G core. It focuses -- it's fully
compatible with 3GPP, and for the larger network, with the

independent solution and you see on the right side, the
technical advantages and it's -- and it's 10 gigabits and
also up to 1,000 second signal propagation time. It also
shows no interactions and it can connect also 1,000 devices
can reach this via a kilometer. And they just operate --
it's independent so their own frequency spectrum. It's
unlimited pass to mobile and usability and the security is
also -- is important because they have their own premises
to operate. So they can -- it's very compact. You can
transport and for your production, you can use it. And
then I will show you here. On the part of the German
Bruckers. They also set up kind of remote production for
through the campus networks. And you see all of this --
and you see these experiences and because of the time York
go through all of this. I just want to show there has also
tested it to work. We have smart mobile labs and you need
to think who could be your partners and what it brings for
your product, for your process.
     So I will just conclude my presentation and just sum
up the 5G can be used to enable the technical. It's
global. It should be super fast and easy to implement and
also we can enable the new production workflows morally in
the remote production. And for life events we can use.
And the 5G campus network gives us how you can manage your
parameters and deploy your network. And also the projects,
what I mentioned now, the two projects show you can also
use your use cases also this production -- the production.
     Yeah, and then I thank you and stay healthy and.
     (thanking people in different languages).
     And back to you Susanne.
     >> SUSANNE RATH: Thank you for this presentation, this
very interesting presentation. As I said before, we will
now directly go further and have questions and answers in
end. Please put them into the chat box.
     So our next presenter will be Andy Quested, chair of
ITU-R, WP6C and he's deeply involved in advanced media
production. In our case, he will show us advanced
immersive media production and advanced immersetive sensory
media production.
     Andy? We are very interested what you will tell us.
The floor is yours.
     >> ANDY QUESTED: Thank you very much. I will pick up
a little bit on what Judy and others have left off and go
into actually what we are doing in Working Party 6C and the
future vision of broadcasting. Some of these future

visions are already piloting and beginning to be tried in various service media Tories. So how I want to look at this I want to look at the two documents that the Working Party 6C through Study Group 6 have published that are growing every meeting with new ideas being put in, new trials, new pilot ideas being put in. And so we have heard about immersive audio, and haptic enhanced audio for both audio and for effects. Use of text-to-speech and speech-to-text and translation of text as well. AI-generated presenters and content and automated content creation and a bit about automated content curation, in other words putting programs together. The BBC tried that.

     Automated speech and caption translation is something that we are seeing a little bit coming in. Some things with automated audio description. This is really an experiment where the graphics into sports program are being turned into audio described AI, and interspersing that with live comment.

     The other one that I have a passion about, when I would edit on the wrong size screen and is AI aspect ratio and screen shape adaptation.

     Personal media. Pradipta mentioned this and Judy mentioned this, personal media and also accessibility is more than just seeing and hearing. It's -- it's sort of -- you can split it up in four strands, it's what you hear, what you see, how you interact and especially if you have motor function issues. You cannot press red when you are asked to press red and understanding an aging audience can't appreciate the program made for younger audience if its too fast but they can still appreciate the program and the content if it's actually made not simple but actually stretched in some way or the dialogue is -- is simplified so that it's easier to understand.

     And then the UK, I just started picking up on the idea of object media. And I really want to push the ideas how the territories are now beginning to look at the fact that objects deliver content as it's needed by the user and one example is captions are pushed to everybody, so is audio description. If you really want to be efficient in the use of bandwidth and content, you would only send watt user wanted or the audience needed. And so object media is againing to make us think about how we -- is beginning to make us think about how we make content for this new world.

     So a long time ago and some of you have seen this before, we had to rethink about making media. And how we

can make it both personalized and accessible.

     We see -- I think the audio is probably the easiest
one to describe, because everybody is becoming aware of the
different options that audio now offers from the full
cinema mix if you have a full cinema system at home,
through to dialogue enhancement, dialogue plus, which is
very, very different to clean audio, or clean dialogue, I
should say. It's pointless just having clean dialogue if
some of your story is told in sound effects but it's
difficult when the sound effects are masked by music. And
caption and caption plus. It's giving more information
than dialogue. It's really becoming part of the
storytelling process. You can do that with vision. You
can do that with interaction, with devices, and you can do
that with understanding. And to do that, you need to start
making programs in a layered process.

     The essence. You know, in the essence, I always say a
program is born accessible and born personal. So it starts
with the script. It starts with an accessible narrative.
You then move on into the layers. You need to actually use
to create that narrative, sound, vision, data, objects,
et cetera.

     And then what can you change in those layers? You
don't want to be able to make the captions so large that
they now no longer fit on your screen. But you might want
to make them larger than they are actually sent. And it's
how you can adjust and how much you can adjust. And that's
the control layer. What is the platform and the device
that you need. And how can the data all the way from the
program maker, the creator of the content be used by the
user to get the best possible quality of experience.

     I don't particularly mind about quality of service.
Quality of service is different to quality of experience.
You can have quite a poor quality of service and a good
quality of experience. We have often see that in news.
But the other way around, is -- is pointless. If you have
a great quality of service, but nobody really likes the
content, what's the point?

     So I they go hand in hand, but I think we should
concentrate on what actually gives a good quality
experience.

     One other area I have been looking at is presenters
and how we are now seeing metahuman evolution and what you
are seeing here is gaming related. Building not just
fought faux realistic but faces you cannot actually tell

are not real people.

These are now available in realtime, on free software. It would be mean that, for example, could you change the ethnicity of a signer. You could actually make a signer anonymous, or you could build a signer. I could see Karen, built as a metahuman but what would that allow? It would allow Karen to be sent by data and it would move to 100% signing as opposed to signing studios and limited signing zones. Why is signing put out at 2 a.m. for people who are recorders? And here we are seeing the true merging of games technology and TV technology.

Common user profile. Practical example of what could be done. My TV, my I pad. The same program, many thanks to the BBC for letting me borrow this. One with a signer in vision and one with captioning. If you look at the aspect ratio, you can see that it's been framed on the I pad to match the way the screen is shown. That is just data. That can be sent by the program maker, to fit the screen that you want to see it on.

And, of course, the final one that you look at when you will want to be fully immersive. What additional services do you need to make it fully immersive?

Quite a few experiments and my thanks to NHK about immersive video itself. And a number of people are trying the next thing which is virtual space sharing. This became very popular, obviously over the last recent months with lockdowns when people wanted to share experiences of viewing with their friends and family, who may not be able to visit them or be even in the same country as them. This is beginning, Ben to see the use of gaming technology applied to not just program making, but program viewing as well.

But you need to make the content in such a way that this works.

I just wanted to finish off with some things we have been looking at, how some of this technology is actually being used for very different reasons and I will show you video to show you with. Very short video, about 50 seconds but these are the links you can see and the presentations will be available afterwards. It's something to look at and listen to or see what you feel about the idea of user technology.

I also remind people and Judy mentioned this, I don't want to wear a headset. I remind people with hearing aids, how large hearing aids were 20 years ago and we see the --

the drive of technology to make them not just invisible, but actually to make them much, much better. We will see this as Judy mentioned with headsets. I can't see them becoming contact lenses in the next few years, but certainly glasses possibly and something that's very useful for someone would does wear glasses a prescription version would, very simple to make.

So I will leave you with this, which I think is a fantastic use of embryonic technology.

>> ANDY QUESTED: Thank you very much for giving me the time to talk to you. Thank you.

>> SUSANNE RATH: Thank you, Andy, for this very, very interesting and present talk. Please put your questions, everybody, into the chat, so we collect them for the later discussion.

Our next speaker is Ievgen Kostiukevych, for IP and cloud production at EBU. He will tell us about hybrid cloud live production. The floor is yours.

>> IEVGEN KOSTIUKEVYCH: Thank you. It's such a pleasure and honor to present to this vast and diverse audience of the ITU. I will tell you a little bit about our work at EBU and what we have been doing with the migration of the traditional broadcast in the sense that we are using a base band SDI moving slowly towards IP and now to the cloud. And the cool thing, it's my first time presenting at ITU and I didn't really know what to expect in terms of other presentations and I'm happy to hear that what I will tell you will hopefully resonate what Judy was saying and what Andy just told you, about how the cloud helps you billing all of these exciting new capabilities and exciting new enhancements to the content. What we traditionally think about the cloud, it's someone else's computer, out there, up there, somewhere in the data center, and we have been using clouds for very, very long time.

For thicks like archiving, for things like -- for things like archiving and cloud computing and we have been using clouds to use things Ike drop box and for building streaming services the modern streaming services are fully cloud based. The current situation that we live in pushed the media organizations to embrace cloud even further and this time also for things like live broadcasting, because what is your typical event setup, if you are using traditional remote production?

You have something like this and you have our OBVA in.

And you have your cameras and you encode them and you send them somewhere. Maybe you are using public Internet or some sort of dedicated circuit. The reality is that sometime soon you will be using things like 5G for this. And then the content gets in where automated there and whether you are using public Internet. It will end up at your broadcasting facility, but what is -- what if your broadcasting facility is not available anymore or what if there's a lockdown or some sort of social emergency that your broadcasting facility is not there?

Well, you will just spin it up in the cloud and that is the reality today. I'm using the Amazon Web Services, AWS example, but it doesn't matter because most of the cloud providers will offer you some sort of media capabilities and your independent software vendors will build on top of those capabilities but the reality is today you can build your full broadcasting facility and using more technologies and then you can enhance that with the hybrid approach where you have some of the capabilities on site and some of the capabilities in the cloud. For example, you can use things like live transcoding or live transcribing that's running somewhere in the cloud while you are using the on-site production.

A lot of broadcasters and we just had this discussion yesterday at the annual technical conference. A lot of broadcasters are starting to experiment with these sorts of approaches by billing something in the cloud, for example Sky recently built their news -- replicates the newsroom in the cloud and now they have flexibility. They have something that's out there ready to be someone up at any moment and this enhances your content creating capabilities. Cloud is a lego. Cloud you can build all sorts of work knows on demand and any scale and then you just add additional blocks. This is a typical linear production where the content gets out there and you send it back and you can enhance this and add a streaming pipeline or automated meta date, automated subtitles may be a phase detection. Maybe you want to have an archival pipeline at the same time. Well, when you record this in the cloud, and this recording gets automatically enhanced by the I will three in the buzz word by AI tools where you store this alongside your metadata and when the editors need to get access to that, it's just there.

Then when you need to adapt this for a different language or a different culture, you just do that

automatically in the clouds and on demand. And so cloud is
one of the technological enablers of technological
transformation. It's not about the technology. It's about
the audience, the content and the things that you do with
the clouds and what Andy just said is fantastic example of
what you can build using these type of things in the cloud.
Metahumans and automatic subtitles and automatic
translation and you get yourself ail virtual presenter for
any ad hoc session where your real presenter may not be
available.

Or in a disaster, you have everyone at home. They
connect to the cloud MCR, they collect to the cloud
newsroom and they produce breaking news without living the
safety of their houses without putting them in danger of
social contacts or whatever the situation may be and then
you build it once and it's just there. It's there when you
node it and only for the time that you need it when you
don't need it any more you Doppler radar paying to down and
about out it down. And the cost of ownership for the
broadcasters and maybe smaller, maybe more agile
broadcasters, is getting more accessible. And if it fails,
it fails fast and cheap and you can iterate and build
another solution on top that.

So this is the sort of things that we are looking at
EBU, giving the platforms and exploring the platforms that
build the exciting tools for the future of the content.

So thank you very much. And back to you Susanne.

>> SUSANNE RATH: Thank you very much, Ievgan also for
this very, very interesting talk.

I'm looking into the chat, there are not so much
questions which means you all were very, very clear in what
you said but I have -- I have some -- one question to each
of you more or less.

The 5G campus networks, we saw some trials what do we
need from ITU or in general that this becomes reality that
we can use it in normal lives so to say?

Can you tell us what -- what is the gap from trial to
reality?

>> KISHIGBAYAR DUSHCHULUUN: Yeah, ITU has done quite a
good job. The ITU already opened the frequency for 5G,
which -- yes, for some -- I mean the C band is just opened
to IMT systems and also this is opened for mobile network
operators in Germany, but the upper part of that, the 100
megahertz is reserves. Because in Germany, they wanted to
push the industry, they wants to improve the production and

we also look at that, not just industries but also
enterprises. The broadcasters want to have look at what
they offer for our production side, and as I said in my
presentation, the media broadcast is already set up this
production network and also we need to improve this, you
know? It's also how can you deploy your network. What
kind of companies do you want to use? Also these projects
are running, open plan, 5G, open call and so on.
     And for them -- (No audio) we reduce our costs we used
this first for remote production and also for the Nordic
applications because at the moment, this campus network is
just for the static users, but this -- the applications are
discussed in the national level. And also, what I
mentioned was the sim cards, it's from ITU, it's already
given ITU-T and 999, this number is a closed network, a
campus network.
     If you want to have -- if you want to move from our
campus network to the public network, how can we do this,
you know? And how should be international subscribers,
mobility, these numbers are also still discussion in there.
I just want to say that.
     >> SUSANNE RATH: Okay. Thank you very much. More or
less the same question to Iergen. What do we need? Do we
need anything more than just start to use the hybrid cloud
like you presented it to us is?
     >> IEVGEN KOSTIUKEVYCH: This is a very good question.
What do we still need to do? It's a lot. It's industry
collaborations and this is a very important part of the
story because when you just scratch the surface, on how you
build this services, you go into the whole rabbit hole,
what is the metadata schema and what is the connectivity
for going back and forth, the cloud? What are the co-Dex,
what are the timing and synchronicity. And going through
the cloud, and there's a whole question on ethics and with
the enhancements of the AI driven and meta humans and AI
driven journalism, there's a question of fake news.
There's a question of deep fakes and there's a whole other
both technical and the content kind of editorial aspect to
that. So I think while there's already a lot of industry
discussions in a lot of forums going on. There's SMPT
looking into that and I think ITU will play a very big role
here in terms. Connectivity, in terms of availability of
connectivity, 5G. Should it be a satellite propagation in
the cloud? Should it be public Internet or dedicated
links?

We'll get there. It's inevitable, the future is cloudy, for better or for worse, and there is -- there is no kind of -- I don't think we should lie to ourselves saying, yeah, it's somewhere out there. No, it's here. It's happening. And a lot of broadcasters are already using it. It's just a matter of trying what you said, what -- I totally agree. We should dip our toes into this and I encourage every broadcaster and engineer to give it a try. It's not expensive. It's not hard. The skills the knowledge is there and we should start experimenting with that and building something -- maybe build a proof of concept and see maybe in time this proof of concept evolve into something more sophisticated that you just have in your portfolio as a tool. And when you need it, you just pick it up and use it.

>> SUSANNE RATH: Mm-hmm.

Thank you, Ievgen. That's one thing you can do, just give a trial and let's -- let the broadcasters try.

Andy, I know that BBC did a lot with object-based audio that they tried a lot with it, but for TV production, what you presented, I think is a complete change in workflow, how to produce it. Can you maybe tell us a little built is it possible to change from normal production to object-based with all of these great things you presented and will the broadcasters ever be able to afford that?

I know this is a bit negative, but I know all the -- yeah. -- the buts from the broadcasters. Even starting with object-based audio, only audio.

>> ANDY QUESTED: I mean the simple answer, if you were to walk into any certainly public service broadcaster now, the answer would be go away and come back next year.

>> SUSANNE RATH: Yes.

>> ANDY QUESTED: Actually, it's come back next year. Let's not think this is something that is going to happen overnight. Ievgen, the very last thing. Cloud is a tool. AI is a tool. ML is a tool, machine learning, all of these are a tool to program makers. As you start to put them together, you start to see the ability to do some of these things. Not actually it's a big bang, here it is. This is a complete program that's totally accessible, and totally personalized. The other thing, of course that makes this happen is regulation legislation, so the accessibility acts rather for the EU and the UK are really demanding in terms of responsibilities. We have also done within Study Group

6 an update to one of our documents on the global platform, which adds content -- componentized content creation.

This is beginning to happen now. We can easily say that if you are just looking at a program being made for a single territory, its going to be expensive. So most people are looking at selling their content. If you sell your content, you don't just think about things as simple as language, different language captions, different language for voices, you have to think about territorial differences, cultural differences. Things that you can't put in one culture. Especially swear words between English American and American -- English and American versus English. There are words we condition use between each other, let alone have them translated. So you start to make versions, you start to then layer your programs and once you --

>> Recording stopped.

>> ANDY QUESTED: You have the main components. What you have the them in components then everything we talked about becomes feasible and eventually affordable. So it's -- it's -- I will come back to a very, very simple mantra from an organization called Can I Play That, which is the gaming organization. It's a group of people in the US, that have formed a group and they rate games for accessibility.

>> Recording in progress.

>> They have a simple mantra, more players equals more money. That's all you can say. The more you make your program accessible to everybody, and the more you increase your experience, the more money it will make, the more money you have for your next one. It is a chicken and an egg, I'm afraid. But start with one.

>> SUSANNE RATH: It's like it's with always new things and chicken and egg, yeah. Part.

So thank you, everybody, for me, extremely interesting session. With that, I give back to our chairman.

>> STEFANO POLIDORI: Thank you very much, Ms. Rath and all panels for session three. We are running behind schedule a little bit. So we not delay. Very pleased to bring to sage Mr. Yukihiro Nishida who is the chairman of ITU-R Study Group 6, to lead our last session which will cover the future content delivery for television. Now, this session is the longest one, that we planned, and being behind schedule, I would like to remind all panelists to stick the time that was communicated earlier. If you can

skip some of the part that is already covered that would be appreciated. Nishida San, the floor is yours.

>> YUKIHIRO NISHIDA: Thank you for the introduction and the kind reminder. This entitled the future content delivery for television.

Well, we have over-the-air in terms of broadcasting, satellite broadcasting and cable television and broadband networks. There may be wireless and wired technology. And another categorization may be fixed reception and mobile reception. It may be possible to say IP best and IP based transpart.

Over the years, the environment of audio visual content delivery for the end users has dramatically changed in various aspects in terms of new delivery means, new user devices and new user behavior.

So it is very timely to run the status of different delivery systems and the future prospects.

And today, we have six distinguished speakers who are -- who are highly qualified in each of the different territory platforms. And at the end of the session, I would like to ask some questions, including those from the audience, the speakers, if time permits.

So the first speaker is Mr. Jean-Pierre Faisan, chair of the communications Working Group, at broadcast network Europe. And he will talk about terrestrial TV broadcasting networks. Jean-Pierre, you have the floor.

>> JEAN-PIERRE FAISAN: Thank you very much. I will share my screen for the presentation.

Good morning or good afternoon, or good evening, everyone. Thank you also for the ITU and for the organizers for kindly inviting me here and Yukihiro for the introduction. Terrestrial TV platform is very important. On the one hand because of its wide reach and popularity, and on the other hand because of its unique role in sustaining free -- access to free-to-air television to everyone in Europe and also the rural sector.

In what follows to try to assess the conditions for futureproof terrestrial TV broadcasting networks, I would like to highlight three points. First a quick introduction of where we stand. Second, a look at how the platform is going to evolve, including also taking into account of the energy efficiency for the television delivery in various modes and finally a look at one of the success conditions can is the continuous access to band.

I speak on behalf of broadcast networks Europe. We

are actually at transmission facility provider, we invest in transmission towers and facilities on behalf of our customers which are public service and commercial leading companies for TV content or also radio content.

First point I would like to highlight is the traditional terrestrial television is the primary source of trusted information and quality content for European citizens. Just a few numbers linear television remains extremely strong, 3 hour and 34 minutes of television per population per day and 90% of that is consumed live. So, of course, usages are changing but there's still a very strong background for -- for access to linear television.

And out of that, the digital terrestrial television platform remains the number one distribution platform for linear TV in penetration. It's not necessarily the case in market share, but it's present in one way or another, about 100 million households in Europe. And so it reaches about 250 million Europeans. It plays essential elements in terms of helping to have very trusted information where there's a lot of online disinformation. It's an essential source for quality information. It also respects privacy, and anonymous consumption. It plays a strategic role being the backbone both for the regulation but also for the financing of a lot of the audio visual content.

How is it going to evolve? We are considering three accessible television. Higher quality, high definition, improved sound, interactivity with Hbb TV. This goes into the second point which is the complementarity with online usage, DTT and OTT are complementary. And hybrid TV through OTT for nonlinear, and also where complementary to the other access which is reaching also DTT's mostly for fixed reception, and this can be made possible by the 5G broadcast.

The future is how sustainable this is also in terms of energy efficiency. Here we have some new findings from which was studied by the commission of a group of sponsors to try to compare the various energy consumption and carbon emissions of various television platforms, television delivery platforms in Europe and across the various countries now and in the future. We compare basically three platform, distribution through OTT or manage IP telco managed distribution through IPTV, and I would not go into the details of the findings but I would like to highlight three.

First, delivery through digital terrestrial television

is the least consuming means when compared to IP delivery
method and you can see on first graph the difference is
quite important. The first graph includes the TV set,
we're considering in the delivery the whole chain. It
includes the TV set. If you take out the TV set, which is
considered to be the same in three modes, you can see that
the difference are even stronger by the factor of 1 to 7
with OTT and a factor of 1 to 10 with IPTV.

Second finding, which is very important, just that
this is a diverse landscape, and this is present across all
European countries. Of course the numbers will vary but in
all countries, we will see that DTT is also most energy
efficient. Now, how will it evolve in the future? They
have studied various evolutions. Trying to take into
account evolutions in the share of viewing and, of course,
linear viewing is probably going to decline and nonlinear
will increase. Also access to content, such as subbions
will increase in the future and this is taken into being in
the calculations. So what we see are that the horizon of
2035, the net advantage, despite a great improvement in
efficiency for the Internet delivery, the advantage remains
for DT it.
. The conclusion for that is -- DTT. The conclusion
is that in the future in Europe, scenarios where DTT usage
is given strong will be beneficial for the environment.
And now coming to my last point. To ensure future proof of
broadcasting television, UHF spectrum is a vital resource,
it's a vital resource to operate now, but also to inknow
elevator and compete with -- innovate and compete with the
other platforms. I will not go into details because I
understand that we are short on time and some of it has
been covered by my colleagues in the morning on the
spectrum issues.

What I would like to highlight is that the spectrum
roadmap is totally Durr by 2030. Countries, for instance
in the UK have extended the licenses to 2034, and there are
new laws in France which paved the way for UHD. We have
heard several countries explaining their plans for enhanced
of digital terrestrial television and the story goes on.

Regarding the spectrum issue, we are in favor of no
change for the core remaining spectrum, the 470,
694 megahertz band.

As the conclusions three takeaways, the terrestrial
broadcast roadmap combines linear TV, and nonlinear and
hybrid mode. The European UH. F decision in terms of

spectrum ensures the core spectrum for terrestrial broadcasting and PMSE for the long term. And this brings huge environmental and universal access to free television benefits for the benefits of the European citizens. Thank you very much.

>> YUKIHIRO NISHIDA: Thank you very much, Jean-Pierre. Well, as an employee working for broadcaster in Japan, I concur. Thank you very much.

The second speaker is Mr. Chuangchange, Miao with fixed network media with the at ZTE corporation China.

And here to talk about IP based delivery television. Mr. Miao is yours.

>> CHUANYANG MIAO: Thank you Mr. Nishida, I will share my screen. Oops, sorry.

>> CHUANYANG MIAO: Hello, I'm working as a rapporteur for the Q13 of Study Group 16. And today it's my pleasure to take this opportunity to share my view point of the future content delivery for video service on television.

Yes, and it starts from a group of statistic data. The table shows the main Chinese operators in 2020. The mobile traffic operation in terms of the three operators almost accounts for half of the total revenue. Mobile traffic has increased by 30% compared to 2019. As we all know, we do -- we have always been the largest part of the tracking data whether on the mobile network or the fixed network, however, due to the lack of the new service, and market spot, it's difficult to portray the traditional TV service to attract new users and the revenue goals is close.

So how will this situation affect the service chain in the future? From the previous data, we can see that the end users have stronger mobility and -- oh, sorry.

Strong opportunities. The communication operators are currently in control of the many basic native resource and inefficient service. The OTT have abandoned the service operations and lack of network resource, and there has to be some network capabilities to reduce the operation costs. So how can everyone benefit upon this? A possible ideal way is that some infrastructure networks or capability hosted by the operators will be open to OTT. So that it includes the service operation model. New service may be introduced through the end user and the natural resource can be improved.

Meanwhile, OTT and the service provider can reduce their operating cost to the any user. So back to our

topics what is the direction of the content delivery innovation, and C DN has been used for many years and will exist at the basic capability for a long time in the future, but in the future, the content deliberation should be marked by the key features which I have listed here and converged services, with the capability of the ultra high bandwidth and massive connections, mobility and it will build on open resource and capabilities. And maybe you have noted that there are four features that completely match the five scenarios. That's just one of the examples I will mention today, which is not limited to 5G only.

Now 5G era, operators are facing the rapid increasing of the user and traffic volume. One of the key factors is the new requirement and the features of the video service with 5G scenarios. For example, had the video service is coming into people's daily lives. We should require higher efficient video delivery service which is lower latency and deeper deployment in age, and support will cause the traffic in certain short period, especially in the density population district such as the stadium, airport and other areas. The effects obviously.

The third one is 8K plus, we are all AV,en athat requires more bandwidth and takes more computing powers. So those features will invariably lead to the huge CDN services and while the computing capability will become more common, and the coding and the GPU rendering. So undoubtedly the waterfall of CDN cannot meet the requirements of the new service -- the new video services. A lightweight 5G solution can solve some problems in the past efficiency by realizing the multi layer distribution of the content through the intelligence of this inclusion system, they can distribute the content for each network layer, more flexibility and which significantly improves the content of delivery of CDN.

And by taking advantage of the virtualization, a CDN can be developed quickly over public or private infrastructure and be capable of activating and scaling, which can be efficient solution against the title effect. And a virtual CDN can be closer to the end user and quickly fill this with hot content to retrieve if from the other CDN node while the video service is ongoing.

And MEC-C DN is an great example. Therefore, a MEC-CDN can provide computing power. So for example, they are interactive and testing something, like that.

So with the future development of the cloud computing,

virtualization and age computing, some functional components of the C. DN will be gradually integrated with the underlying network as a common network capability. CDN is no longer as overly department. Providing content scheduling and providing a class service and scheduling.

And so the last thing I want to mention today, specifically is the interactive realtime multicast service. The live broadcast service is subsequent to the inadequate multicast. Now the interactive led broadcast service of taking up more and more market shares. So future live broadcasting networks need to be end-to-end, be Millie seconds later. In future will be used as Bier and Quic, and the leverage the CDN technology. So in the future CDN may not be the only video for television content delivery. CDN may not be as pore of a physical network but will exist as delivery functioning merged into a transport network. So now we are facing the infinity possibility.

Okay I think that's the things I want to share with all experts today. Thank you very much. The into are is back to Mr. Nishida.

>> YUKIHIRO NISHIDA: Thank you, very much Mr. Miao about the interesting presentation of CDN which is a I have important role for OTT. Thank you very much.

So let's move on. The third speaker today is Dr. Curtis Knittle. The vice president of wire technologies at CableLabs and he will talk about cable television delivery. So Curtis, the floor is yours.

>> CURTIS KNITTLE: Thank you, sir, and good day to everybody, wherever you are located around the world.

My name is Curtis Knittle and I lead the wired technologies organization at CableLabs. For those of you who don't about CableLabs, we are the leading innovation, research and development laboratory for the cable industry. We have 65 member cable companies located around the globe. Some of the largest telecommunication companies in the world and we have established relationships, a robust collaboration relationship with thousands of vendors and through our members and our vendor community, we create technology that is impactful around the world. So today, I will talk about some of that technology. I would like to, though with some trends on video and table. I apologize right off the start for using a US-centric chart, for a European event. But we believe that the chart is relevant to the European community, showing the same types of trends. And the important item to note is the lower part

of this chart, the traditional multichannel delivery of
video is, in fact, declining, being replaced by
over-the-top video, virtual, multichannel, that sort of
thing. And so by 2025, the traditional multichannel
delivery will likely be in the minority here and this
obviously has a profound impact on content creation, and
distribution and my presentation is about the distribution,
the literal deleavery of video over the -- delivery of
video over the air. They are migrating to the IP protocol
for distribution.
     So the results for the cable industry or twofold. The
cable operators are adjusting to support delivery agnostic
content aggregation and OTT distribution, whether it's a
coaxial cable. The cable operators are evolving to support
that type of delivery. And at the same time, they are also
hosting, NetFlix and Amazon Prime, et cetera.
     Now on the network side, the cable operators will
continue to evolve their networks to support the cast that
Brad band subscriber requirements requires. And it goes
beyond capacity, in fact. It's about reliable, security
and lower latency and this is it latter result that I
intend to spend the rest of my time on today. So from a
technology roadmap it resolving around the coaxial cable
and fiber optic, primarily. On the top of this chart, I'm
referring to technologies and their capacities that uses
the Docsis, many have deployed Docsis3.1, but Docsis is the
predominant coaxial-based technology that cable operators
use and coming up next is Docsis 4.0. This was orthogonal
duplicating and stronger forward error correction, for
example. Docsis 4.0 extends the use those technologies to
provide 10 gigabits downstream and 6 gigabits upstream.
And looking beyond Docsis 4.0, we do believe that there's a
lot of life left in the coaxial cable and so we fully
anticipation of a Next Generation of boxes and we Doppler
radar know yet what the capacity of such a solution -- we
we don't know yet what the capacity of such a solution will
provide. Our target is 25 gigabits per second or more over
the hybrid coaxial network. And under deploying passive
optical fiber network to the home. So this shows the PO.
     In technology evolution. Today, most of our operators
are delivering fiber to the home services using a 10 gig
PON, whether that's the ePON from the IEEE or the PON from
the ITU.
     Next up is a 25 or 50 gigabit PON. There's two
channels two wavelengths to support 50 fig and, of course,

the ITU, in fact has recently ratified a 50 gig down and 25 gig up solution. And then on the far right hand of this chart, I'm showing a new technology that we're referring to as coherent PON or CPON.

I will have some words to say about coherent PON as soon as I provide a little bit of information about Docsis 4.0. So in essence, over a coaxial table any telecommunications channel, more spectrum means more capacity. So let me start as a reference with the current solution for deliver over HFC. And this is Docsis 3.1. In ITU recommendation, J.22 a. We have three architectures Docsis 3.1, it's low split, mid split and high split. Many of our operators are on the low split category. Some have migrated to the midsplit and we have many of our European members who have already moved to a high split technology, which this latter one is suitable for gigabit symmetric services which seems to be almost moving to the table stakes category.

And you can see in this diagram, really why cable networks provide the asymmetric capacity. Remember, spectrum equals capacity. As we grow the upstream capacity, we are able to -- I'm sorry, the upstream spectrum, we are able to grow that upstream capacity. an Docsis 4.0 continues to extend the upstream capacity. For Docsis 4.0 we have two modes of operation. The top one is generally referred to as extended spectrum Docsis. This uses a solution known as frequently division duplex where the upstream frequency and the downstream frequencies are completely separate and you can see after preferencing the top part we extendupstream frequency up to 684 Meg aMertz and we extended the downstream to a top end of -- of approximately 1.8 megahertz, and there's full duplex, FDX, it uses a part of the spectrum between 108 megahertz and 684 megahertz. So you can see that we are trying to main stream the downstream capacity and but extend the amount of upstream spectrum and therefore, the upstream capacity. And so both modes of operations and Docsis 4.0 will be capable of delivering multiple gigabit selective services and keeping the fiber coax on bar with the present day ePO in.
    .
    I mentioned a new technology, I preferred to it as coherent PO in.
    . So just a few words on coherent PON before I hand the floor back to our moderator. Coherent PON, coherent

technology, actually is an optical transmission technology for many years. It's made its way into the metro networks and just like many other previous technologies, it's made its way into the access network and it's this access network that's the final delivery step from say a cable operator hub site to a subscriber home. The special thing about coherent PO.

In technology. First of all, it's -- PON technology, first of all, it's never been done before. Traditional P. ON has intensity modulation, and all of our PON standards today are standardized or specified around a nominal 20 kilometers distance and nominal 32 way split. Each of those numbers can vary but if you increase the distance, you reduce your split and vice versa, if you increase your split, you reduce your distance. It's all about power loss. Not only are we going to increase the capacity by a factor of ten, relative to to today's PON, we are defining a technology that's able to go four times farther than traditional PON and support a density or a split ratio that is 16 times higher than what traditional PON can support today. This is actually very important for the cable industry. And any telecommunications provider. It will be a telecommunications industry technology. But, you know, just to represent the importance of longer distance and higher density, I overlaid on a map around Paris, just the significant difference that's capable with this PON technology. From Paris going 25 -- approximately 20 kilometers out, and it's still a 32-way split. You can see how far out from Paris we get. Down here in the bottom being as I mentioned before, it's four times farther distance if we keep that split ratio the same between the two solutions, coherent PON will go four times farther. And on the left-hand side, it's about some it. If we are going out around 25 kilometers from Paris, we are able to split that PON from 24 to 32 ways, and comparing that to the coherent PO.

In solution, extending out from Paris, 20 to 25 kilometers, we are able to provide service with a single OLT support. We can provide solutions. This is currently providing 10 or in the future -- the near future 25 gigabits per second. All of this to say as the video creation and the protocols change and the capacity increases and going from, you know, H. D to 4K to 8K, we will need more capacity. And the previous slides here shows what the cable industry is currently working toward

to support the higher capacity and the future video
delivery.

So with, that I thank you for your time and attention
this afternoon and I will hand it back to the moderator.

>> YUKIHIRO NISHIDA: Thank you very much, Dr. Knittle.
And now satellite television has been an important part.
But today it's still evolving further. Thank you very
much. So let's move on. The first speaker of this session
is Mr. Nick Stubs at the satellite operators associate and
if we talk about satellite television for everybody. So
Nick, the floor is yours.

>> NICK STUBBS: Hello, everybody and thank you for
the invitation to join your workshop. I will just get my
presentation up for you. Super. So I'm speaking to you on
beof the ENEA satellite operators. I'm Nick Stubbs and I
work for SCS, which is the world's largest satellite
operator. I think we see a number of trends in the --
shaping the future of TV. Clearly increase in demand
streaming, increased viewing on the move, and something
that's very important for satellite is the increased
consumption of 4K UHD in the home and satellite has a big
role to play in that.

We also see a lot of consolidation taking place the
emergence of new platforms like NetFlix and Disney plus and
existing pay TV platform, we have seen it invested in
Africa and there's additional trends like targeted
advertising, user interface and UI, choosing the personal
content and the new move away from SVOD to AVOD, how does
this influence the role of satellite and future of
television? Well, in fact when we look at the market share
of satellite over the past years and you see that on the
left hand light blue bar, it's, in fact, grown initially
and it's now pretty much stable at just under 40% in
Europe. You will see on the right-hand bar that OTT
viewing has increased from zero at the beginning to 22%,
but what we are seeing is OTT viewing is complementary and
linear TV is remaining incredibly robust. That's good news
for satellite because satellite is one of the best means
nor distributing linear TV. It's one of the most cost
effective.

So satellite operators carry tens of thousands of
digital channels to hundreds of millions ever people
worldwide. What we have seen in terms of linear TV
channels, yes that number of TV channels is broadly table,
although it's increasing in emerging markets and slightly

eroding in certain mature markets.

However, satellites are there not just for distributing video direct to home or cable networks, they are also there to provide a lot of other data services, to broadband operators, for instance, in terms of backhaul and contribution, to mobile operators, to provide connectivity to ships, planes and other vehicles, and, of course, a lot of this content is, of course your videoon tent. We see connectivity with the cloud and we are partners with AWS and Microsoft Azure and you can get on to the satellite cloud from virtually. If you are looking at broadcast, satellite is cost effective it's resilient for national broadcasters and it's always there. It's always on. It's also highly adaptable to the new emerging formats whether that's 4K, 8K, or other formats there and it's also pretty low cost solution. If we look at the broadband side of things, well, increasingly, satellite is also coming into the play there. Either in terms of backhaul or direct-to-home and obviously the emergence of high throughput satellites or MEO and LEO satellites are able to do direct-to-home and that's delivering direct-to-home.

Satellite is firmly, direct to home or direct to the viewer or contribution backhall to the different networks such as cable, fiber or output.

Just a couple of words on DVB I and 5G. Think this is a trend that will come in the future and satellite will exbrace that and we will move in that direction. Just as we embraced 5 good.

As a backhaul in the 5G. What can we do? Broadcast by satellite will be around for a very long time. It's develop resilient and cost effective and there's a large install base of satellite receivers out there. There will be an increased adoption of 4K and 8 K. and greater demand for bandwidth and we are very well positioned to provide that bandwidth and we are seeing a lot of our customers launching 4K channels. We have the pay TV operators in Europe, like Sky with one, two or three sports channels and we also have commercial broadcasters in Germany also launching 4 K. channels.

Certainly this move towards IP, there's an increase role in delivering to the edge or in the backhall to make sure the video gets on the broadband networks.

And certainly, we will see this continuation of the linear and the on demand TV but we firmly believe in the resilience of linear TV.

I think that's basically in the interest of time about what we can tell about the role of satellite and future TV. We are definitely very much there together with the future, together with you. Thank you vex for your attention. And I would like to hand back to the moderator. Thank you.

>> YUKIHIRO NISHIDA: Thank you very much, Mr. Stubbs.

>> STEFANO POLIDORI: Sorry to interrupt. I would like to give a communication. So our sign language interpreters will have to stop at 13:10. So we apologize for the inconveniences but they cannot continue. We are running behind about 20 minutes. We hope that the captioner can continue until the end of the event. However, I wasn't able to hear from the captioner. So can the captioner just answer in the captioning, whether she's able to continue.

(Yes, I am able to continue).

Thank you very much. So we are going to continue until the end of the event which I believe will end around 13:30 and I hope so. Thank you will, Mr. Chair and please continue with this understanding.

>> YUKIHIRO NISHIDA: Thank you for that information and thank you Mr. Stubbs for the interesting and I see that is a very interesting topic. Thank you very much.

And please speak out today in session 4, it's Dr. Roland Beutler, the technology and production director at SWR and the chair of EBU's program on distribution, and he will talk about 5G broadcast. So now, Roland, you have the floor.

>> ROLAND BEUTLER: Thank you very much, indeed. I'm just trying to release my presentation, hoping that you can see it now. Yeah, indeed.

Thanks for having me in this very interesting conference as of today. I heard a lot of things that are very, very exciting and well, I hope I can contribute a little bit to it as well. I have to start with an apology, actually, I changed my title because in the process of preparing for today, it occurred to me that talking about 5G in general terms for the media sector is probably not a good idea, within inten minutes. I narrowed the whole topic down for the distribution of PSM, public service media content services because this is actually something that the EBU strategic program on distribution that I am the chair been active for more than six years. Okay, my slides are not moving. I don't know why.

Oh, they are moving. Let me start with something that's almost trivial but I think it sets the scene. It's

important. Talking about SmartPhones and tablets as personal and portable or mobile devices.

I mean we all carry them. Probably some of us, not just one. It feels a bit like they turned into electronic interfaces in the world meaning we expect that they can do anything that he we fancy, we want to have, including access to media content. We heard today that there's new devices coming around the corner, variables or even goggles and glasses that give us access to even more exciting opportunities in the future.

So these are strategic contents for all of our content services I mean not just for in demand. It's true that you can have access to linear services through streaming, on demand streaming on these devices through our labs but the problem at the moment is that this does not really comply with our remit, in particular things like free of of the could and free to air and all of these services and at the same time, we believe that these devices need to be served with high quality and there's another exciting, very exciting future use case coming around. We heard that also several times now, it's autonomously driving cars. There's some trials we are doing on this. Now autonomous driving cars giving the users spare times. You can work, you can sleep or consume content and media and frankly, speaking, or just clearly -- to be very clear here in principle, if you are not driving anymore, what we can have being established is a 360 degrees head up display. You don't have to look in the direction of travel.

Another important thing is and this is what we are doing at the moment is working on geo-referenced recommendations so that you get recommendations to content and services that have some relation to where you are going or where you are coming from and also travel-related information and services are important.

Now this is where the 5G broadcast journey started six years ago.

There was a new study item being proposed in 3GPP, the organization for mobile communication technology. Enhancements for the eMBMS, when we saw this in the ex BU, we decided that we as broadcasters need to be engaged because this touches upon the core of our interest in business and we can't just leave this to the industry to come up with solutions. What we did at the very beginning was actually we injected our requirements, public service media requirements with respect to television services.

Now as a said before free of air. This is at the core of
the requirements. We to serve large areas and there are
technical things that we also injected into the process.
This has been taken on board and cast in corresponding
standarrizations and specifications at 3GPP that has been
released with release 14 and 16.

     The requirements that we just admitted were cast into,
for example, what they call cyclic prefixes. You would
call that a guard interval to be able to build large SFN
networks. We were supporting fixed and mobile reception,
flexible network capacity, and very importantly, because
also the intention at the very beginning was that we would
like to see that broadcast network operators could play a
role in this domain in the future that we could set up
dedicated broadcast networks for 5G broadcast exclusive.
We have been providing the transport node in order to
enable. That.

     This is not the end of the story. Release 17 is
underway and there's plan for release 18. The big question
was 8:00, what kind of spectrum should we use in this? The
5G broadcast as it's been specified is a broadcast system.
It's a downlink only, stand alone system. There's no
uplink needed for this but the question of which spectrum
was important. So 3GPP was important. One is actually
specifying, six, seven, eight megahertz carrier band so
they could be used in interleaf mode with the transmissions
and secondly the question to enable that in the sub700 ban.

     3GPP does not usually provide guidance whether it
comes to implementation to the market or the marketing
departments and we went to ETSI and created an ETSI spec
that's called 5 good.

     Broadcast system for the radio TV broadcast services
and the title is on the screen. This is already published
and it will be updated in due time.

     Now the question about spectrum at the end of the day
comes back to ITU, and the ITU-R and we are using the ETSI
standard and injoking it into the ITU in order to be
recognized as a broadcast system so that by definition this
system would have access to a spectrum that's allocated to
the broadcast service. This brings me already to my
takeaways. One thing that's very important and I think
becauses a lot of trouble in the discussion is 5G broadcast
is not meant to replace T2, DBV-T2. It actually addresses
a different use case. It targets entirely and exclusively,
SmartPhones, tablets and auto systems. So if you want to

target stationary and you have T2 up and running, you better stay there. Do not migrate to 5G broadcast.

It is carly linear TV and it will shall be deployed by the network broadcasters first place. I can't see this happening at the moment.

It's also a wonderful means and to actually inform the public in cases of emergency and crisis, something that happened unfortunately in Germany in summertime, very disaster flooding took place. The mobile base stations went down and some broadcast stations were still up and running because they are basically supported by digital engines. Now if we wouldn't have had 5G broadcast on air and in the devices would have been enabled, 5G broadcast, we would have reached basically all the population easily because SmartPhones and tablets could be recharged by using this in the cars.

We are not only talking about linear television or linear radio services we need to ensure that it's possible to have simultaneous usage of proper 5 G. unicast networks for on demand services in conjunction with 5G broadcast in order to unlock new innovated use cases and business opportunities. And clearly, this is sort to say the specification standarrization work but there's a lot of trials going on worldwide at the moment, and you can find more information on these trials on the website of the 5G media action group. Link is put here for you -- for your usage. Thanks a lot. That's the end of my story, of my presentation for today.

>> YUKIHIRO NISHIDA: Thank you very much, Dr. Beutler for the interesting presentation. Yes, this broadcast is very hot topics in ITU-R as you mentioned and the successful deployment in the future. And I also find it very interesting that you can assume the future of autonomous cars. That's very interesting. Thank you very much.

So the next speaker today and our last session is Mr. Mohamed Aziz Taga. He's product owner for 5G media services with Wrohde & Schwartz.

>> MOHAMED AZIZ TAGA: Thank you very much for ITU for inviting me to be a speaker in this this wonderful meeting and event. Today, I will not have any presentation, nevertheless, I will have only a speech, because I think -- of course, in giving our point of the view from the vendor perspective, and, yeah, that's why I would give a point of anyhow as a starting point. It's important to keep in mind

that as a -- as a broadcast vendor, or broadcast leading
vendor, from broadcasting market perspective, it is very
crucial -- crucial for us to shape the future of the
broadcasting industry, which means everything, what comes
after existing broadcasting technology, after a certain
point of time, that we reach a level, we need to look at
what is right futuristic technology that could fit why not
potentially be able to swap the existing standards in the
near and the far future. This is a very important point
that we are focusing on strategically speaking. It's very
important for us to create a very centric, clear approach
between telco and broadcast. And it's a mixture between
telco industry and broadcast industry as has been mentioned
already before by Roland that the requirements of
broadcasters are in the core of technology, when it comes
to 5G broadcast. That means also from our perspective, we
have to bring the best of at least two industries together
since there are multiple other industries that are taking
place in the game, and we consider 5G broadcast as a cross
industry technology as has been also previously there.

     As well on top of what I said important for us to
design new ideas around business incentives and dry to
deliver short time to market in order to speed up and find
out for a future for TV at the end of the day. This can be
done actually via are the reoptimization of the broadcaster
resource allocation and usage, for instance, into one too
many approach. This can be done on an application level,
of course, depending on the vertical addressed.

     And also, this can be easily achieved via the
reemphasis of a global footprint. Our global footprint by
bringing a universal technology and this is referred to the
trials worldwide where we are actively working actually.

     But also, an important point I wanted to cover within
my short intervention leer is that I'm always hearing from
now and then what is the real relationship between
broadcast media and 5g broadcast, how do you see this? And
my answer to this is since the earlier releases from 5G,
from 3GPP perspective, we looked at enormity and IMO it.

     And broadcast and media and that means from one side,
since the telco industry itself became much more mature at
a certain level and maybe also the mark itself became
really naturate then the industry leaders started to
explore more innovative steps, for example, like media and
broadcast. This started already six or seven years ago
already.

And from the other side, it became really a -- a fact that those leaders from the telco industry want to seek for new business opportunities under the umbrella of new verticals of course, so we got -- at the end of the day, a network generation 5G that can address new applications are for instance, media and broadcast. And moreover, I would like to clarify this, the media sector became more and more important and really influencer day-to-day lives to cope with the new challenges both, for example in protection, distribution, delivery and especially when it comes to efficiency, reliability, flexibility, and as well as total cost of ownership, that's very important. And another important chapter I would like to cover that has been somehow also asked within the ITU meeting today via the Q&A session, that always people are asking, okay, we heard many times right now about 5G broadcast. What is exactly still missing? What are the next steps maybe towards the commercialization? Maybe I can give this, because role LAN's 5G bra you can is ready for prime time, in other words it is ready. But a bird cannot ply but cannot unfortunate fly without its wings which means in other terms the end-to-end solution is quite ready from a vendor perspective like we are. Based on the current market needs or requirements and even more. Of course compliance. I believe the devices which is the missing piece of puzzle at the end of the day will come soon. I'm quite convinced about that and it is not a question of if any more, it is rather a question of when, right question we should ask ourselves. And another important step here is that there are bottlenecks that are not yet clarified. Through market readiness and market scaling. As the technology itself became more and more mature, I believe that it is just right now up to the market to give the green light and that they are willing to adopt it.

Then comes the next step which is the market fraction. The industry also, broadcasting and media industry needs to demonstrate that it's willing to make commercial commitment to many partners, not only us as vendors but also other vendors who are playing an important role in the mark and then the market scaling that means once the adoption is there, market scaling needs to take place. They need to demonstrate the so-called economy of scale in order to achieve the right business case for all the players. Looking out of the box, it's our dream to make everybody happy. But just to showcase something is not sufficient.

We need to look into the next step.

And for the sake of clarity and trying to answer the previously asked questions within the Q&A, or even within the chat, that 5G broadcast is almost everywhere. We talked China and Brazil and India, and we sense some interest from the US, however, I believe that right now we need to really focus on the big funds so the wheel can start to move step-by-step slowly, so just the information for all the participants if this is an interest to get more information concerning your trials, you can get in touch at any time.

The last point that I would hook to address that was covered by Roland was the regulatory frame. Of course, there is a multitude of choice for spectrum. The 5G is spoiled for deployment, technical deployment. However being the regulatory frame is very important to take too being. That's why currently 5G broadcast is from one side, 3GPP. That's a fact. And it is right now still in kind of discussion mode within the Working Party 6K where it's expected to be continued from a worldwide perspective.

I'm convinced that WRC-23, which is coming two years from now will play a very important role in relation to 5G broadcast or maybe even the other way around, that where 5G broadcast will play a role of a joker within -- within WCC-23. Thanks a lot again, Nashida-San.

>> YUKIHIRO NISHIDA: Thank you, very much, Mohamed.

Now we have two and a half minutes left before the end of this session. And I have seen some questions in the chat box and the first question I see was about the 5G trials. So Mohammed, or Roland, could you explain your trials on 5G broadcast in Europe?

>> ROLAND BEUTLER: If you would allow me to say something. If you go to the link of 5G media action group, then you will find more information there. What I can tell at the moment in Stuttgart where we are living we are having a trial for one year and still going for another, together with Porsche and Mercedes-Benz and we would like to get our services. One is on linear television using 5G and on demand using the 5G network and we are doing these what I mentioned before to your reference recommendations for content.

So that's one year to go and we hope to find some more results there.

The connext, they are doing software development on the receiver side and there's more. Just go to our

website, 5GMAG.

>> YUKIHIRO NISHIDA: I'm very sorry I misunderstood the closing time. So we have to close our session very soon.

So today, we learned a lot about the content of the future delivery system for television, and one important message I received so far is that different delivery systems are complimentary rather than competitive. So with that, many thanks to the speakers and I would like to pass the microphone to Stefano.

>> STEFANO POLIDORI: I found this session really terrific and informative. Thank you very much. Ladies and gentlemen, before concluding our event today, I'm very pleased to call on stage my partner who helped organizing this event, and with whom we started together this successful series since January 2018. From Jaroslaw uponner, the head of the ITU office Europe. The floor yours to.

>> JAROSLAW PONDER: Thank you very much, Stephano. I would like to thank you all very much for -- and thanks to everyone for participating in this excellent workshop, a special thanks to all of our incredible moder ators and panelists for the fruitful discussions. We appreciate that you presented your experience and your splendid work and that you and your organization are carrying out on the critical issues. Thank you also for audience for the participation. We see that Europe is working hard on tackling the challenges associated with the future of TV and the technical point of view and a policy perspective. We are very happy to see so many colleagues joining us today. We reached almost 300 participants and many others following us in the YouTube channel. So we see that the topic is really of great interest. At our European level but also beyond.

The panel discussions give us insights into the initiatives and actions taken by European countries and other institutional stakeholders in Europe and beyond. That was the future use of TV. Today's workshop covered a variety of topics such as regulatory and policy frameworks emerging and convergent ICT structures and services as well as user interfaces and accessibility issues.

It's enabled us to continue new opportunities but also challenges. And what can be learned from the current trends. What appears clear today, with this workshop is that coordination and information sharing among the

European countries, with the international and European institutions are vital for the future of television in our region, both as means of entertainment, as well as a tool for reliable information.

I want to take this opportunity to reiterate the commitment of ITU to assist countries in Europe region on this topic. As you may know, year 2022 parks an important milestone for ITU and ICT community. I wish it draw your attention to the upcoming three global conferences to be held in ITU next year. Where the ICT stakeholders will take decisions on the future actions to be undertaken to foster digital innovation, including this one, happening in the field of television. Let me refer to the WTSA happening in March and the one in June and the plenipotentiary conference taking place in September/October.

Today's event is the continuation of the 19th event on the future of television for Europe which served as a platform for both to share our knowledge and to learn from each other. I look forward to a future event as part of this series. Before we close, I'm also drawing your acto the work of the three sectors related to the future of television, ongoing under the Study Groups namely Study Group 9 on broadcast -- broadband, cable, and TV, multimedia Study Group 16, Study Groups 6 of the ITU-R and broadcasting services and the Study Groups of development sector, and the one enabling environment for development of telecommunications ICTs and Study Group 2, ICT service interpretations for the promotion of sustainable development.

Closing, please let me also thank all partners of this big undertaking, all members of the program committee, cureating the program, I would -- our ITU Secretariat team working hard on each detail of this meeting and the captioners, as well as the sign language interpreters as well as from a financial did, for the financial contribution of Ms. Saks thanks to which the workshop benefited from even wider range of accessibility in the future.

Also let me thank you to Stefano who has been passionately striving this and spending a lot of time to in order to make sure that all components are coming together and that we both really enjoy great content and great working together which will continue in the future. With this I thank you very much, and wish you a good

continuation and looking forward to seeing many of you again in the future events, hopefully in person and with this, I hand back over to Stefano.

>> STEFANO POLIDORI: Thank you very much for your remarks for your collaborations to initiate this series of events and for your continuous support to this endeavor.

And actually I wish to echo all the credits you have just mentioned and let me reiterate, my gratitude to the planning committee, which I wish to name, (Reading names) and as for setting this excellent lineup of speakers and thank you to Dr. Chaesub Lee for opening the event on behalf of the ITU. We hope to continue this series of events on the future of TV in the region, the pandemic situation does not have planning but we are exploring to organize the future of TV for Africa.

So stay tuned with us. This is Stefano Polidori. So stay well and stay safe.

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