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>> Of course, if they are adding new services, they are not adding services for the TVs sold this year. They are adding services for all the install base. And Americans are not interested in updating the software of the TV set that has been sold two years ago and I understand that. That's their business. But this is creating some friction, and some difficulties in how to implement services.

>> PETER MACAVOCK: Thanks very much. Does anybody have any questions? Not yet. So stay with us. So our next presentation is really about 5g, and about its importance to the video space. So Adam Davis works with Synamedia and he's on his way home from Cologne.

>> ADAM DAVIES: Yes, I have been Cologne all week for another video trade show. Thank you for inviting me to speak here. We have been talking about 5G for a long time. We know it's going to be a transformative technology in terms of connectivity and bandwidth, but really, what does that transformation mean for the video industry. But when we talk about high bandwidth and high‑speed connections, video is synonymous with the use cases and certainly we are seeing ‑‑ we're seeing the opportunity for the video and the entertainment industry, that Synamedia engages in to be able to take advantage of some of those technologies.

And we're also going to look at how that development is changing. What some of the new developments are. That's a lot to cover in 15 minutes, even at 5G speeds. I will make sure we keep it focused on one or two key areas of development that we think or we believe will be driving that change and enabling it. As everybody else has talked about, the IP transformation, Tom talked about it in his transformation. And Javier has talked about it. I think it's important to put some numbers and scale around it. We are seeing enormous increase in use of mobile technology for video consumption. It's effectively being video. And of that 80%, comfortably over 60% of that is in premium video services. So that's the long form video, that we are starting to consume and also, you know, our children and families starting to consume as well.

And it's also leading to the massive shift in audience. And we are seeing a significant change in the audiences or engaging with those services and I will talk a little bit about that and an enormous amount of video traffic will be delivered over mobile as well. So what is 5G going to deliver for us. Extensibility, obviously, connectivity almost everywhere, with high bandwidth and low latency is, so much faster, but that speed will enable to watching the next World Cup game or watch the 100 meters final of the Olympics. Intelligence as well, but as you start developing a high‑speed low latency network, you can put intelligence at the end of the network, and we have been doing that with content delivery, but now we can start and put some intelligence and smart capability at the edge of the network, and that's what we will get to deliver that content and video experience.

An alternative to fixed line, and alternative to ADSL, that goes back to that shift in demographing. And I know that, you know, there are some questions about exactly how much bandwidth mobile will deliver. But if you have been working in pay TV for the last 15, 20 years as we have, you know there is a shift away from ‑‑ from those subscription services, from those fixed line cable and satellite services. They are still popular among certain demographics, but I think pretty much every presentation today, has talked about how that change is happening. You can bet that those millennials not willing to take the 24‑month contract for video are not going to be taking one for broadband either them be connecting however or whenever they can. It will be 5giga hertz. We will see UHD, and 4K and 8K services to enable IP services over 5G and that, again, is going to give the opportunity for consumers to have that content, however they want it, but there are things that they will be able to do to make sure that we can optimize that experience as well.

IoT is always talked about a 5G use case and with public transportation systems, they will be become ubiquitous. Right now, it's expensive, though. At Cologne, I was talking to a vendor with automotive platforms who are telling us right now, they need two sims per car and that's $50 per month, per car. Certainly that's quite expensive to just connect your car. 5G is going to be able in time to be able to cult that down to deliver an improved experience. So you are not just delivering a high‑quality video stream to the car but actually, you will have multiple profiles in that vehicle. You will be able to have the kids watching one thing and possibly you watching one thing of a connected device. So we are seeing how ‑‑ how 5G is going to be able to bring more content as well as better quality with the number of devices supported. And that low latency and a little bit technical but 3.5 to a millisecond will mean that we can use things like network slicing. So we can start providing dedicated bandwidth and you will see this much more with content creation and media generation in the field.

You will start to see and we actually saw this with what NBC was doing in the Olympics, actually, in Korea, using 5G, in place of WiFi or standard SDI connectivity to generate content locally, and move that back. Actually being one of the viral things of the Olympics was a ‑‑ I think it was toboggan going down a slope. It's one of the most watched clips of the entire Olympics. That was all in 5G. You can see how we will be able to interact with the content.

But part of the low latency, the MEC.

That allows us to put that capability, that smartness and that intelligence at the edge of the network. So what that's going to mean, obviously, there's going to be less congestion. As we can take media and content to the network edge, in one format, in what we would call a mezzanine format, we would have the encoding or the transcoding, so you are not going back to the head to get that content but it's actually being distributed and transcoded locally to you and that gives us multiple options for monetizing as well.

And it gives the applications greater context. If you know what the application is, you can start doing local and hyperlocal services for things like dynamic and targeted advertising. And, again, I would say about half the presentations today, have talked about the opportunity for increased addressable and dynamic and targeted advertising.

So there's going to be a lot of deployment capability and a lot of deployment options for what we are doing and this is what we are talking about, both bringing the media processing, the real heavy lifting in video. We are taking those 15 megabit files and pushing them to the edge of the network and stepping them down for the appropriate device, but also bringing some of the client applications into the edge as well.

So what does that mean? What are those things? I have talked a lot about low latency, but also bringing in things like location, location‑based services for the content. So that may be language‑based. It may be content blackout windows which we see, for example, in the US, where you can't stream again within 25 miles of the actual stadium it's taking place in.

On the other side, thinner and easier clients. We have been doing this already and we have seen lots of people doing. This effectively putting the intelligence that sits in the application back in the cloud. So you are streaming it. Difficult with 4G, but actually, something that 5G will be able to do quite easily. Because of that, multiedge compute capability, actually, we can start pushing the ‑‑ the smartness and the business logic into the cabinet or into whatever the microcell is. So you are now using a much thinner client and a much thinner client means improved battery life. We are looking at benchmarking around this, but we expect that we can improve battery life and if you talk about the single biggest problem with viewing video today on the mobile device, it's battery life.

And we have all ‑‑ you know, most people have done ‑‑ after 20 minutes of watching a live game, your device is so hot that you can barely hold it. You can watch your battery tick down. It's like the seconds ticking down in my presentation. You know you are burning through your battery. For a game, you may not get to the end of the game. So we want to see those improvements and improved security.

We talked a little bit about security, but in things like watermarking. And watermarking is really part of a how do we protect the content going across the network? I'm sure there's a whole bunch of service providers here who were kept awake at night and suddenly that content ‑‑ we saw with "Game of Thrones" with multiaccess edge distributed capability, we're looking at how we are able to stop some of that content source, but use the distribution of the network to be able to make sure that it isn't distributed or when it is distributed, whatever it is, it needs to be stopped.

And that goes down to things like, again, local content being targeted to the right areas. And understanding where that content is going and targeted advertising as well. The opportunity for local and targeted advertising is enormous with 5G capability.

So a nice techie slide. Really the point of this slide ‑‑ and I think I'm supposed to be able to point to things. It's about bringing together both sides and the 5G radio network and the cable network and the satellite head end. And I will jump to something that we have already seen with Vodafone in Germany with the gigabit service. It's running a cable set stop box with connectivity for capture, video and demand, recommendation services and then the launch of giganet, which is a peer network service. If you are going to make money at this. If you are going to run this efficiently, you can't run multiple platforms of multiple services of different silos. They need to be brought together and it needs to provide a consistent experience for the consumer as well, because that's how you deliver targeted advertising.

If you make sure that the consumer is capturing the right content, as seeing the right content at the right time and they are able to engage with it, and critically, you measure it in the same way as well, so you generate a single currency for those advertising, for the advertising content, because that's what the brands want. Ultimately, the guys who will be giving the money to your service need that single consistent measurement.

So to summarize, 5G gives us a huge opportunity to improve the entertainment service we have, and the better quality, more varying options and way better use of experiences. But the chance to build smarter systems, systems that use fewer resources, systems that allow us to take advantage of the devices and the sunken investment that's already out there. It's coming soon. It's true. You know, over advice to our customers is to start working out, don't let somebody else build their audience. We saw with Tom's presentation, actually, how NetFlix have just zoomed past everybody! Now is the chance to start building those hybrid services because actually, we still do watch a lot of broadcast linear TV. That's what we engage with and that as what we like to watch. But how can you enhance them and don't wait for 5G to come along. Make sure you are building those services now. And I think I'm on time.

>> PETER MACAVOCK: Any questions for Adam? So we have a look a little bit about the client side of this enterprise and the LOVEStv application. We now heard an awful lot more about the primary distribution side and the aggregation side. I will now look at more deeply into the distribution. So Peter Siebert is in DVB office. He's the head of technology and we will talk about DVB‑I.

>> PETER SIEBERT: Okay, Peter, thank you. Ladies and gentlemen, we all have one problem in common. We must make decisions. And decisions are very often based on predictions and, yes, predictions are very difficult, specifically when we speak about the future. And I want to show you one prediction from the creator of Youview. That's the interactive service in the UK and the original, let's say the mental thought of this was Mr. Anthony Rose. And in 2007, he made a statement. And he said, by 20xx, broadcast will be dead. And he said by 2012. Today we are at 2019, and we still have broadcast. So this is a good example that predictions can go wrong.

Okay. I'm now sitting here, and I want to speak about broadcast in an OTT World which means I will also make some prediction. I hope they don't go as wrong as the one of Mr. Rose. And I give you one tip being don't put a date in your prediction.

(Laughter).

Because it can easily be challenged at a certain point in time. And before going into the prediction part, it's good to set the scene. That means to look at the data available and luckily, my office is in the European Broadcasting Union which has a marvelous research department and which gives me all of these nice graphs and numbers. And when looking around 46 EBU markets which basically covers all of greater Europe, the good news for broadcast is that daily TV viewing time per individually is basically constant at around 3‑point ‑‑ three hours and 40 minutes every day.

Of course, you can now make a deeper look and you can see how ‑‑ how the viewing time is distributed between different means, and here this is a ‑‑ this is a state of the UK, and we always like to use data from the UK, because we assume that the UK is a quite advanced and how shall I say innovative market. Tom Barrett may correct me on this, yeah, but ‑‑ (No audio).

But you see the inner ring is 2014 and outer ring is 2016 this has gone down. On the other side, media is like YouTube and pay TV have increased their TV. And people are still watching DVDs. So there's still a 4% watching of DVDs. That's all individuals.

You can now look at the famous group of youngsters, so 15 to 24 years old and they as already indicated by the speakers before me, there we see a trend that sees a group of individuals have a strong tendency to go to new media, like YouTube, or pay UD which typically could be NetFlix, but even these people still watch DVDs.

And ‑‑ and another interesting is which device is streaming. The clear winner is television. Okay. I cannot read it. But from the inner ring to the outer ring, there was a drastic increase in consuming streaming content on the TV set. The loser was a computer, and tablets and SmartPhone have a fair share of it, yeah, but it's not really surprising that TV is the best display to watch content and while if available, should I not go for the best option.

Another number this comes from Offcom and this is about life, versus Youview viewing and you see live viewing is going down and the time shifted is going up. Now I make my first prediction. When you extrapolate the current trends of these curves, that will intersect in 2036. So still some time to go.

If you want to know what what a revolutionary change is, then you have to look at the decline of cinemas when TV entered the US market, and basically, cinema collapsed totally around the '50s in the US. But on the other side, you see it collapsed but it didn't disappear. And I think that's another thing to consider all story telling mechanisms have not disappeared. Not any storytelling mechanism has disappeared. We still read books. We tell stories to our children. We go to the theater.

Okay. New things are coming up and weights may be shifting, but nothing really goes away.

So a few intermediate conclusions. Broadcast TV will stay with us, but user pattern and behavior will change. So the transition to OTT is an evolutionary are one and not a revolutionary one. Broadcasters will have to adapt but broadcasters under a good position because they are a trusted brand. In many countries they are a leading or well‑known on demand provider and big screen is still the first choice for consuming content.

On the other side, also OTT and VOD service providers have to adapt as well. They have to provide the same quality of experience as traditional broadcast. And they have to address the big screen in the living room, and they have to provide an easy navigation for the OTT services. So there's quite some challenges ahead. But there's no need to panic because as I said, it's an evolutionary change. So you have some time, and on the other side, the DVB project is here to help in this transition process and for this transition process, we have started a new initiative. We call it DVB‑I and the I stands for Internet. I hope that Peter will not correct me. The idea is to bring broadcast and OTT together.

And DVB believes that OTT should just work as well as broadcast, and for this purpose, for this objective, we are building the standard so it will ensure TV continues to work, even when it's not always on a TV. So basically you see DVB on every device.

So what will DVB‑I be? DVB is famous for our physical broadcast, terrestrial cable and satellite. They are around for many years and managed the transition from analog to digital and they are well‑known and well‑understood. And DVB‑I will be a new member in this family and it will be the standard for the Internet delivery of content. And it will deliver services to devices with a broadband access which means over the top, but also over managed networks.

So we also want to have a solution for the managed networks in addition.

And the objective is that it's a user experience shall be similar to what people are used to from the broadcast world. And all devices with Internet design scope, not just TVs and set top boxes. And, of course, the holy grail is to reach the TV in the living room, and there are various attempts or various ways to do this, like you go for ‑‑ you can go for an OTT streaming device, like a stick or something else.

You can go for TV app and install the TV app on your televisions and those of you who have a smart television at home may notice that there are quite a number of TV apps already installed and need to be upgraded all the time. Or the OTT streams comes to you like the broadcast content. No need to install an app. It's just part of your regular user interface of the television and this is what we should aim for.

Okay. How can DVB help? DVB‑I help in this? Typically OTT services are deployed as apps and I have put here some hopefully well‑known app items on my slide. Apps from been helping the industry to come to innovative solutions, but the problem for the user is he has to install many apps on his device, because the content comes over many apps and not all apps are on all platforms. For the broadcaster, he needs to provide and maintain the apps for several platforms and also the problem for the broadcaster is how is he visible in an app‑based universe.

How can he get the necessary visibility? And the manufacturers, of course, they have the problem. They have to adjust their products to support many apps and certify the functioning of apps and it can be hard to provide a consistent user experience, and it basically results in several solutions to the same problem.

So there is a quite range of improvement, and coming to my last slide and to my conclusion, why is DVB‑I needed? DVB‑I will do for ITT offices and OTT services what the classical broadcast services have done for the transition from analog to digital. This is what we are working on. So the servers will be signaled and distributed in a standardized manner and so a specific app is not required. So we will provide a standard for this, and assuming and hoping that the world adopts this standard, then there's no need for individual apps anymore.

A receiver can present a nice list of services and content, and this list will not only show the OTT content. But it integrates the broadcast content in the list. It's also something that we are working on. Users don't have to know or to care where the content is coming from. It's all taken away by the network and the television and the user just has to make this election and get the content from the best means to get the content.

And broadcast can deploy a service once to a wide range of devices. And manufacturers can make a single consistent user experience for DVB‑I and broadcast services.

And I forgot to mention on the slide where we stand in the DVB‑I project. So currently the technical team is working on the DVB‑I technical specification and the first phase of DVB‑I, we work on the service discovery and the service list. And this standard shall be finalize or the specification should be finalized by the October time frame and I all invite you for this year to come to the IBC in September in Amsterdam and there we will have the first DVB‑I demo and we are all very excited about the demo. Mostly I because I have to organize this and my excitement is will it all come together by the time of IBC, but I would love to welcome you at our booth in Amsterdam and show you what we have achieved.

Thank you very much.

(Applause).

>> PETER MACAVOCK: Any questions for Peter?

So we have heard about different aspects of this particular ‑‑ oh, if you could pass down the clicker, please. We heard about different aspects of this particular problem. From the HPDV perspective and the application side. From the DVB's perspective, and the distribution side. And we have heard also from more the aggregation, primary distribution, and the content production side. So there are different aspects of this particular problem, IBB. I get to questions a bit on this topic. And the final presentation focuses on set top operating systems and it's from Yan Haifeng from Hisilicon. And after that, we will move to a more general question‑and‑answer session.

>> HAIFENG YAN: Thank you. So today I'm going to talk about the terminal. The terminal part, the smart TV operating system. So I will go quick around the 10 to 15 minutes. So we will just cover ‑‑ I will just cover about why we started it and the other systemwide and standardwise how we develop these standards and the other is current status and what is next for TVIs.

So first, let's look at some UHD status in China. The UHD is developing very fast in China. First, I think from policy‑wise, the government, the related government department has released many policies to encourage the industry to develop this UHD, and the other is two formal UHD channels already start broadcasting in China last year.

And also, I think the transmission bandwidth in China has increased quite incredibly within recent years.

And one more thing is I think more than that, I do not have accurate number, but more than 100 million UHD terminals already deployed in China market, include TVs, set top boxes and other terminals. So I think with all of those things happening ‑‑ so I think customers start to accept UHD, which can bring them more user experience. So they are willing to pay for UHD. I think in China now we are like paying for special UHD, VODs, paying for that and increasing quite a lot within recent years. And all of that, more new services are coming up, such as VI, AI, online education, all of those games, and ‑‑ and with all of this is happening but we are still in a terminal, we met a big problem. I think some of them may already mentioned, the fragmentation in the terminal.

So not only the set top boxes TV between different operators, even within operator, they have different middlewares. Different casts, different hardware classifications and different hardware configurations. So for the software stack running inside the terminal, it's very, very different from each other. I think as an example, one province in China, a big province, even in one operator, the total different types for them is counted around 60 different types of set top box running currently deployed in the system.

So this is very difficult to deploy those new services. First it's difficult to development. Add a new service, and need to adopt to all of those different types of terminals and difficult to deploy.

Also, do not ‑‑ because all the UHD content and the new service, they want to protect it. Those terminals currently do not have unified security mechanism. So also we think another one is we think the terminal as handset already becomes smart. So we think for the TV terminals, media terminals should be also be smart as a trade. So that's why I think under the ‑‑ the ‑‑ I think in China, national ‑‑ national radio and television administration, they started a team, set up a team to start this TVRs. So our TVRs vision, we make a vision bigger to be a global leading smart media terminal, and try to collaborate with other key technologies to make a smart media terminal updating system and we try to build an ecosystem to support long‑term development.

So let's look at what we are trying to solve. The issue. What's the target for that? So the main thing, I think, first the new service can easily extend it adding ‑‑ adding to this system, and the user experience should be consistency within the system.

And for the development should be easier. This platform should cross different hardware platforms and also this one should have a system level security mechanism. And at last, the system should be involving continuously, have sustainable development.

So okay. According to all of those requirements. So this may be more technical. So we designed architecture, trying to solve all of those issues. I do not have a point. So I just briefly introduction. For the low layer, kernel layer, this is the layer that we design to cross platforms and we define the requirements for the hardware, what kind of hardware can support those TVR systems and above that is component layer. Component layer, we are trying to put many TV‑related components embedded into the system, such as broadcasting, cast, DIM, and we have a unified media engine to play all kinds of different medias, and we also have application manager try to manage install the system, install the application into the system. And also this layer, we make it very flexible. So every component is designed as a separate process in the system. So it can be added for removed very easily. So adding out new component, new service into system would be very easy.

And only with component. So it's difficult to say smart updating system. So TV Rs will support different kind of application framework.

Currently TVRs support the Java application framework on the web. Why we took Java into picture is currently, I think the Android already has a big ecosystem. So we want to reuse the mature ecosystem. So TVRs will also support the Java IP Is compatible with Android APIs. The other is we also define a web application framework. This is ‑‑ we think TVs, the web will be our future long‑term application types. And also currently we are working on ‑‑ we are trying to add an application for lightweight apps.

So TVRs is designing in such a way, the main functionality we are trying to put into the component layer and we are open to many other ecosystems and trying to build one mainly for our own. But currently it's difficult to have an updating system and suddenly build an ecosystem for your own. It's very difficult. So that's the way we design.

And the other on the right side is for the security. So such a big system, it's very difficult to say there's no bugs and there's no ‑‑ you can make it very secure. So that's why we designed at TE, the environment, that this is mandatory for TVRs. So this is our kind of closed system. So it can have sensitive ‑‑ if you have sensitive security, functionalities, you can put into this system. This system we can manage because it's kind of small. We can manage to make it secure enough.

Okay. So that's more or less the actualized. That's more or less covered.

And the other one thing to address. TVRs is not viewed all to write on script, on our own. So we are using the very much mature open source project, such as media engine we based on G streamer and web engine‑based Chromey. And so we can have better experience ‑‑ user experience.

And why this TVRs? We say it's just not ‑‑ not just a smart updating system. It's a smart TV operating system. TV Rs, we already embed many kinds of features into the system. We add this into the system, trying to make the application more easier. If you want to develop application for broadcast, the main functionality already embedded into system, so application can be very thin, very easy to develop. Also, we have this component features in the system. So can get to the same user experience, even you use different types of applications. So that's something we already put into the system, but we are ‑‑ later on, we are adding more and those things are tailorable. So that's the TVRs features.

Okay. So TVRs and ‑‑ it's such a big system. So it's difficult for one or teams to set up. There's chip set vendors and device vendors and all together under the technical division in the RTA. And so currently we have a total of more than I think 120 hers in TVRs. It's working more like an open source community. So we have the architecture group. Currently I'm the leader of architecture group. And also many, many target groups. And so we work like monthly face‑to‑face meeting together to discuss the plan to make sure that everything goes well and have the technical discussions go together. And we have a collaborative work form. And for the members in TVOS to access, through the source code, all the documents and all the problems and also we develop a self‑test tool to maintain the quality of the TVOS platform.

So TVOS, we also have the industry standard in China. Like I mentioned here, so ‑‑ and for the last one, we also have the performance test, which I think is important, it's because since TVOS is a source code manufacturer and like vendors, we'll take the source code to make their devices, but devices, we want to deploy the application into the system with a consistency. So the conformance test is very important. We currently already have around 100 devices already been tested in China and I think the deployment for TVOS in China is more than 8 million for this.

And since TVOS has a very good practice in China. We want to share to the other countries. So that's why we are doing also ‑‑ also doing the international standards. We start this TVOS standard in IoT. So currently, I think the first one, TVOS Req already approved January this year, and we are working on the others. We started TVOS in 2014. So we already released 3.2. And we are now developing TVOS 4. And it's ‑‑ it's been deployed in many places.

Okay. So what's next? I think from my point of view, TVOS in the current, 3.2 version, for the set top box‑wise, I think the main functionality is already done. I think it's okay for deployment. For the commercial promotion, I think still it's a big job for us to do, because we have different patterns and different kind during deployment, there will be different requirements of this. So TVOS team is not only just develop the standard, develop the source code. We will also help the deployment of the manufacturer operators to use the TVOS.

So the second we will open currently the TVOS is only open sourced to the members but we are thinking of making it for open source outside, so everyone can access, can use and can contribute, try to improve TVOS. And the other is internationalization. Currently, all the documents are in Chinese only. So we are trying to make it open source, we have to make it at least English version, I think.

The other is application ecosystem construction. This, I think, is still a long way to go. Yeah.

So this will ‑‑ I will not go very much to detail. It's what's next, but TVOS, we are not only using set top box. Currently we are still thinking in Gateways and also for the new technologies such as AI, such as IoT areas, we are thinking of. We are trying to add more functionality into the system, thinking this is more or less TVOS 4.0 or maybe TVOS 5.

Okay.

Thank you. That's all. Also welcome to join discuss TVOS together. Thank you.

(Applause).

>> PETER MACAVOCK: Thank you. We have a couple of minutes left over for our various questions and answers. There are two people on the panel ‑‑ is that right? Two or three. Two people on the panel who haven't spoken yet. And perhaps we would ask them to say a few words about their chosen specialized subject. So the first person I would like to call on is Mr. Shiniya Takeuchi from NHK. Would you like to say a few words?

>> SHINIYA TAKEUCHI: Yes, NHK is a Japan broadcaster and it watches DVB‑I. We provide the same user experience content via broadcast, via Internet as we switch channel. And I think another solution is MMD, MPEG media transport, however, the practical implementation of MMT seems to be difficult.

I think about the active D, it's similar to the world Working Party 6 about. And their output is 2400. Just a comment. Thank you. Mack thank you very much. So there is an alternative to DVB‑I. Of course there is.

So Sebastien Noir, your chosen specialized subject in a few words, please.

>> SEBASTIEN NOIR: Personalization, and recommendation. We have been hearing a lot about different kinds of standards. There is one thing why NetFlix and all the big ones, the gaffers are winning and it's not about standards. It's about a single thing. It's the user. And have you not to forget that in the end, it all matters about the user. Everything should be about the user, his wishes, his topics, his interests and whatever is of his interest. And if you can surface that into your applications on to your TV, on to your mobile phone and website, then you have a chance to compete. Otherwise, you are losing the game from the start.

>> PETER MACAVOCK: Thank you. So this is IBB. We heard about two different types of transport, DVB‑I and MMT. We heard from Synamedia about 5G and its potential implications in media distribution and networks. We have heard about a ‑‑ a doubtless, a huge project in China for the development of a TV operating system that's not based on Android, and we have heard also about HPTV and its deployment in Spain. It's deployed in other countries. Spain is one of the more successful ones.

So would anyone like to ask a question. David Wood. Impossible. Really?

>> AUDIENCE MEMBER: Thank you, Mr. Chairman. Actually, I don't know whether I dare ask a question, because I'm one of the low intellect people that Peter Siebert, the 5% who still watches DVDs, but if it's okay if I can ask a question. I just wondered if our friends from cell sex and Peter and yourself, can tell us about the relationship with TVOS and DVB‑I. Do they have similar end results? Would it be interesting to combine them in some way? Should DVB be looking at the TVOS system? Just for somebody who is watching DVDs, a simple man, what is the relationship, the differences, the strengths and so on of those two systems compared to each other. I wonder if that's possible.

>> PETER MACAVOCK: So who wants to start?

>> PETER SIEBERT: Okay. The first comment, David, I did not use the word "intellect" in my presentation. So I just commented and said DVDs are still used. I made no comments about the users of DVD systems. Yeah. And for your information, even I still have a DVD player at home.

Okay. But coming back to your question, David. TVOS is for sure an interesting development, and I'm aware that it's done in China and it gets big support by the government and also a good support from the industry. And you were wondering whether DVBs should be involved in this, and typically, our philosophy is we specify the interfaces through the television. So in my understanding, the TVOS is a kind of implementation issue of the television. And we may have to foresee that something like TVOS is on the market, but in principle, we specify interfaces. That's my comment on this.

>> HAIFENG YAN: Yes thank you. I think TVOS is more like an implementation. Previously we think TVOS may be APIs enough for defining the system, but still in a market, because China market is very complex. So that's why we think we have one implementation is trying to more consistency of the user experience of this. And so that's the thinking of that.

But TVOS is open. I think we are thinking. I think actually TV we have those questions we got. I think TVOS is actually an open system. So if possible, I think previously in my presentation and the architecture‑wise, we have different application frameworks. Maybe we can collaborate and try to, like, convergence of other application APIs into the TVOS system so it can be compatible with ‑‑ in China, we have some standards but also compatible with other standards in this. I'm just thinking about, and we haven't looked into detail into that, but maybe. Yeah. Thank you.

>> PETER MACAVOCK: Very good. Would a TVOS‑type system work in Spain?

>> XAVIER REDON HERNANDEZ: Yes.

>> PETER MACAVOCK: With your knowledge of ‑‑ with your knowledge of the receiver vendor market in Spain?

>> XAVIER REDON HERNANDEZ: I think ‑‑

>> PETER MACAVOCK: No is an okay answer.

>> XAVIER REDON HERNANDEZ: My thought, it's up to the manufacturers to implement wherever they think. There is ‑‑ in Spain, like in other countries, there are, like, recommendations for the receiver market, and there was published a document that was Spanish interactive recommendation and there was also recommendations for other parts. And as long as the receivers that are in the market are complying with these recommendations, if they are using Android or TVOS or using anything that's implemented there, we are happy with it.

>> PETER MACAVOCK: Okay. Any comments from the floor on that particular issue? Is there a role for the ITU here, I wonder? David? Are you satisfied with that answer?

>> AUDIENCE MEMBER: Well, I didn't really quite understand the situation, but it sounded to me as if the TVOS system could be used in conjunction with DVB‑I that the DVB‑I system could be like one app ‑‑ that's the wrong word ‑‑ but one input that could be used in it. So it sounds to me as if there's every reason for some sort of cooperation and collaboration between the two sides.

But I guess I have to be satisfied with what I have got.

While I have got the floor, if I may, could I just turn to the issue of the 5G situation? And what we had was the presentation, which was all ‑‑ to be honest, it was rather optimistic, wasn't it? Forgive me for saying so. You know, it was all the good things that people say about 5G. It's 100 times the capacity. It's going to come tomorrow and so forth. But if you go out there, there are a lot of people saying other things, aren't they, that in order to be successful, it would have to steal the broadcast frequency bands. I mean, I don't know if that's true. And that it would have to have free‑to‑air services and really there's no business plan for the network providers for providing free‑to‑air services. So could you just look at the negative comments that have been made about 5G and say whether you think any of them might have some value in them?

Thank you.

>> ADAM DAVIES: I think it's going to be fantastic David!

Yeah, I mean, realistically, I talked about 2 gig throughput as opposed to 20, there's certain issues about penetration of buildings that ‑‑ that the industry still needs to get through.

But I think ‑‑ I think there are going to be many, many deployment options and what we are seeing with small and microcell 5G which is effectively putting a cell in a cabinet or on some cases, you know, seeing samples in the US of small cells going on the top of street lighting. So there's an opportunity to effectively use 5G to enhance an existing network and I think that's where it's going to start. That's where we are going to start seeing some of the early benefits. So in extending the reach for that last 500 yards. It's easy ‑‑ it's not easy, but we know how possible it is, but the chance to get very high bandwidth capability to the home with a significant disruption to the actual infrastructure I think is going to be one of those things. I think what will drive it will be better quality services and will be UHD 4K, 8K, and enabling two way. I'm a fan of broadcast and when I saw the Tony Rose quote, you know I was dubious because when I sit down and watch Rugby, I watch it on broadcast. So the opportunity is there, but it's to build hybrid systems to start with, and to use 5G is that ‑‑ as that back channel to bring some intelligence, not just to the network, but to the ‑‑ to the TV at the moment, and I think, you know, DVB‑I may have seen some of that.

>> PETER MACAVOCK: Yes?

>> AUDIENCE MEMBER: Can I make a question, just related to the 5G, my question is you have talked about high bandwidth, high number of users but in the end, we will have high band width and low user or we will have or, or low latency or number of users?

>> ADAM DAVIES: It's got to be all three. And we will eventually get there, but this is with technology like network slicing comes in, because you are ‑‑ because there's so much more bandwidth than actually you can start guaranteeing some connectivity. And that's where you will see it used again in other areas not just watching great content on a 4K phone, but for a media production. So you will see network slicing being used in media production. So the diminishing of maybe satellite transmission, back to base, which again is going to change the way that we engage with content, because now if you have a two‑way connection, with an 8K guaranteed bandwidth between a stadium and back at the space, you can suddenly start covering more games and you can do it through cameras because if you are doing it in 8K, you have much higher definition. So it's about ‑‑ it enables higher bandwidth, but what do you do with the higher bandwidth, and that's in part what we are talking about with edge. It's available most efficiently so that the used distribution of the edge as well to put some intelligence in there.

>> AUDIENCE MEMBER: Yes, but my question is we are talking about gigabit per second? No, millions of users and, less than one millisecond of ‑‑ this will be possible in one cell to have 1 million having one gigabit and one millisecond latency?

>> ADAM DAVIES: No, not today but that's where the 5G standard is taking us. You can wait until five years when you get that but you can pretty much guarantee in the five years that it takes to get there, somebody has already built those services like NetFlix did. NetFlix started off as a DVD service. That's what NetFlix was doing. What was their bandwidth? It was your postman!

So it's about using the technology that's available tell right time to bring the right kind of service through and then you transition. The postman goes away. We start to bring you your Amazon packages and you start streaming your video.

>> To be clear, we are interested in this to happen. That is a good way to go, to have all of this together.

>> PETER MACAVOCK: What is the situation in Japan in respect of IBB. We didn't have a presentation specifically dedicated to Japan. What is the situation there? In Europe, we're starting to see a transition from a pure broadcast via hybrid to OTT. Names vary depending on who you are and where you are and all of that. But broadcast only, broadcast mixed with broadband in order to secure bandwidth into a future which may be ‑‑ which may be broadband only.

>> SHINIYA TAKEUCHI: Yes. In Japan's situation, the ‑‑ mainly the OTT service is provided by broadcaster, and some application of the network, commercial broadcaster is combined into one platform, namely TIVO. But NHK, only want the OTT service. And the situation of the IPTV systems, it's wide spread on the receiver and some MPEG player services is standardized for the hybridcast. And the commercial broadcaster provided the OTT service on the player.

>> PETER MACAVOCK: And do you use personalization on the hybridcast platforms yet?

>> SHINIYA TAKEUCHI: No. Yeah, now we try to studies for this personalization for the hybridcast. And now the hybridcast has the function between the relationship between the broadcast and the hybridcast application. And so the data ‑‑ the bureau data can get by a second screen and so we try to use the authority for this. Only 40 ‑‑ only the other network service with broadcasting services.

Thank you.

>> PETER MACAVOCK: Final quick question for Sebastien. So it's not deployed in Japan on their hybrid service. And do you use personalization in LOVEStv yet? You do recommendations in LOVEStv, don't you?

>> SEBASTIEN NOIR: Yes, we do.

>> PETER MACAVOCK: Is that a commercial engine?

>> SEBASTIEN NOIR: No, there are editorial recommendations.

>> PETER MACAVOCK: So somebody does that? They do that in Ireland as well. It's very labor intensive. Do you see a trend in personalization, Sebastien in the European context? What are the biggest barriers?

>> SEBASTIEN NOIR: I think the mineset by many broadcasters is because they have been there for quite a long time, they believe they know the users and by knowing the users they know what the users want. So like every day at the end of the day, this is the right moment for the news and after that, you will have the weather forecast and after that, well, a nice movie should be appealing to the audiences. To some extent where that works. Where you transfer to something that is not linear, obviously this doesn't work so well anymore. Everyone is different. Everyone has different ideas an topics of interest. So the idea that you can have good editors that will find the perfect mix just doesn't work. And even if that would, maybe half of them have been seen already by the user, so you need to filter them out to still have something appealing.

And in the end, this is why NetFlix, Spotify and all the others are so appealing because they bring fresh content every time, and we have been hearing about that about the discovery of content which is a huge issue. And many broadcasters have a lot of content in the archives but fail to surface it properly. I guess the only way to use it is to use algorithm to do this work because no human can do it. It doesn't mean that we have to go in a world where the human is not present anymore. Because it's a strength that we have, to have humans that understand the humans and the local societies, the local culture in a different way than algorithms but we can have content proposed by editors and journalisms and proposed by algorithm and working hand in hand in the same products. This is not a problem. But the key thing is to start understanding that we have one more set besides what we have in the archives and this is a data that we can collect about the users obviously in a way that respects user privacy and is transparent. But if we can do, it then it opens a world of personalization that enables you to give more services and better user experience to your audience. And I guess this is now key.

>> PETER MACAVOCK: Very good. So colleagues, it's nearly lunchtime. Does anybody have any burning questions? David Wood? You didn't get the hint.

>> AUDIENCE MEMBER: Sorry. Could I just go back to Sebastien again. We had a big conference about ‑‑ I think it was called artificial intelligence for a better world or something like, that you know. Who is going to develop those algorithms that you mentioned? Is the EBU going to do that or someone else or how well we get to these fantastic algorithms that are apparently possible?

>> SEBASTIEN NOIR: Well, again some different ways. First, there's a lot of algorithms that are known already or open source and published, and that's a starting point for broadcasters. Second, EBU can help you if you want to go that way, but in the end, you should be in control, because an algorithm that defines the content that you put in front of your user is in a way defining and editorial line. What do you want to put in front of your users? This is a choice you be using, and no one else. If you buy a box to do that, its like buying a box to define which kind of news you should have on a channel. This is crazy in my view. You should know how the algorithm works and if you don't have the right people, it would be a good time to hire them and start working in this way.

>> PETER MACAVOCK: All right. Hire more people. Excellent. That should go down well.

Listen thank you all very much. A round of applause, please for our panelists and speakers.

(Applause).

It's lunchtime. Can I propose ‑‑ I don't know who is in control of lunch. Oh, you are in control of lunch. Super.

>> Thank you very much. One more time for a great session and we are proposing to meet back at 14:15. So we would have 60 minutes, 59 minutes ‑‑ for having some lunch. The restaurant is just at the end of the corridor. Thank you.

(Lunch break)

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