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IMPLEMENTATION ITU REGIONAL FORUM FOR EUROPE 5G STRATEGIES,  
POLICIES AND IMPLEMENTATION

OCTOBER 23, 2020

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>> I see delegates are connecting. Thank you very much for connecting. We can now proceed to session 5 on 5G Implementation: EMF and other challenges for this ITU regional forum for Europe on 5G. Please let me introduce you to the moderator, Mr. Witold Tomaszewski who is expert at the national Institute of Telecommunications, specializing in social education about 5G and EMF.

The floor is yours.

>> WITOLD TOMASEWSKI: Thank you. This is my first time at an ITU Conference. I'm thrilled I can be here. Yes, I will briefly introduce myself, for several years I have been involved in relations with local governments, local societies in the field of education and 5G implementation. We have several challenges for 5G, business, technical, regulatory ones, but we have a great challenge regarding EMF and growing this information around the topic and it is very important to have reliable program information like those provided in this session.

Before I hand the floor to the participants, I would

like to kindly remind that we have 10 minutes per presentation. I will significant fall running out of time a minute before that. Taking into account we have several honored guests with great knowledge in the topic, after the session I think I would like to ask some questions.

Let the show begin.

I would like to introduce Dr. Haim Mazar from ITU consultant and ITU intersector coordinator on RF-EMF to set the context of this panel.

Doctor, the floor is yours.

>> HAIM MAZAR: Thank you, Witold Tomaszewski. Julian, if you can put my presentation 5G Implementation: EMF and other challenges, implementation 5G for good, you will find a report that was approved by ITU-R, ITU-T and ITU-D. Today ITU-D Study Group 5 approved it and so did Working Party 1. You would find it on the web.

I was introduced.

Next slide please.

What we see here, that we have more than 18 billion cellular subscriptions -- more than 8 million, and more than 100% and in east Europe, even more than 110. Why is this important? According to the statistics from China, from India, from Israel, about 1,000 subscribers need one bay station, a macro. We have more than 8 million base stations around the world. When in Tel Aviv, less than 60 meters from every place there in Tel Aviv there is a bay station. Even in rural, 100-meter, 100-meter, you have a bay station. To my opinion, not all the people like base stations near them.

Does EMF matter? In the paper, not this presentation, but if you read what's been provided by the three sector, it relates to EMF and 5G identification of the band and this report will be the third document that provides you very clearly all the circumstances that we had yesterday about the 300, 400 -- not the 300, we'll see that in the next slide.

Identification, these are the three organizations that are related to 5G and we have also IEC, but they're secondary.

The analysis of tables and figures of ICNIRP and the guidelines and IEEE standard, I don't need to introduce ICNIRP because we'll have the secretary from there, what I will do, I will compare and we will see about the frequencies, the 450 to 71 gigahertz only because this is the interest of 5G and the Chairman of Study Group 5 Martin can talk more about that. Exposure limits from base stations, cellulars and handsets applicable to 5G and

compare and contrast ICNIRP because most administrations still use that, we have to compare that to the IEEE and to another.

Open issues directly and indirectly related to 5G and EMF, misinformation, delays in installing base stations, I was asked to go to Bangkok, to go to Russia to try to convince the regulators not to be afraid from installing base stations these are frequencies of EMF, in recommendation 10.36, but it is not approved yet, I hope it will be approved as soon as possible, okay, underlined are the important frequencies, and the 694 to the 960, this is one in the 80 and the digital dividend in the 700 and I underlined the 2.5 to 2.7, yesterday we spoke about it and in the chart you can see my view about the option is a little bit different than what's going. Then we have the 3.3 to 3.7 gigahertz, the best for capacity and the coverage is still good.

The new one, those are following the agenda item 113 to the Conference 2019 we have the 25 gigahertz that already is operating in Australia, in the United States, Sweden, and in Australia, importantly, they were making many measurements of EMF at the 27 gigahertz, the 4, not open yet, the 46, 48, 66 to 71, but the most important, it is the 27 and we held yesterday our proposal to make some options about this. My view is very simple, that we have less operators than frequencies so give the frequencies to the 5G and it will go on with minimum processing and we had spoke about it yesterday.

Next, please.

Questions to be raised what, are the questions? First, global monitoring levels are very low relative to ICNIRP all over the world, even in the U.K., they have the 5G, it has been 1% or less, in France, they arrived on one occasion to 11%.

Next.

Compliance calculations and some periodic measurements are essential. In Israel we make once a year for every base station but in the report we write that we can make it occasionally. Now the question, what are the questions.

However, do we need to make so many nation-wide measurements? We will find again that the levels are very, very low. This is the sensitive question, maybe the ICNIRP and IEEE reference levels are too liberal. If all over the world the levels are too low, maybe the levels are too little. It is a question, not a response from ITU.

Next.

Okay. So this is in IEEE in 2019 and 2020, it shows

that they're well-coordinated, even the quotations, they're from the same sources. What we see here is very interesting. About 6 gigahertz, the penetration density becomes shallower. It is the same 6 gigahertz that noose capability of coverage due to penetration and coverage. It is very difficult to get covered. In the same 6 gigahertz you will find that the depths are shallower. It was last month, a Conference here, it was EMC2020 in IEEE.

Next please.

Measured power absorption, what you see here, in 1 gig where it is about 25 or 28 centimeters wavelength, the penetration of the signal is higher than the penetration in 10, it doesn't say that the 10 is more dangerous, but it says that if you compare it to the GSM900, the 1890 to 15 up link and down link and the 945 to 916, that 30-centimeter, all the head will be there and even all our body would be there but in 10 gig, where the wavelength is strict, so the penetration, it is low, it doesn't say that it is more dangerous.

>> WITOLD TOMASEWSKI: 1 minute.

>> HAIM MAZAR: Excellent.

We see here, it is from ICNIRP, we see from 2010, 199, the computations.

I will leave others to speak about this.

Next, please.

You see here, very clearly how the general public is five times less more restrictive than the worker, very clear, you see it follows five times less.

Next, please.

In one shot here you see all of the power density and field strength all over for occupational and the general public. For sure you will find that below the 40 megahertz, there is no power density and about 2 gig, there will be none. This is well explained in ICNIRP and IEEE.

This I mentioned before.

Next, please.

This is from the Chairman of Working Party 1.5 and question 3/5 and you see it is important for administrations that some of them prefer the meter, not the density.

Next. Then ICNIRP and IEEE, the 5G system, exposure, you can see that very nice. You can see that more in the paper itself.

Next please.

This is the most important. What do I write here? That between the two, the general public and the

professionals, next, please, and they are exactly the same for all, about 400, they're identical.

Next.

For all 5G the 2 and then the 10 -- next, please -- then you see all of the others, exactly the same n is important to know, if we adopt -- this is the proposal of mitigation techniques, maximize RT to operator in order to decrease number of site, it is well explained in the document and maximize sharing including active frequencies sharing among cellular operators and close the wi-fi access point when not in use.

We go to slide summarized as administrations are encouraged to follow the ICNIRP and IEEE guidelines or set their own experts, the best practice for administrations that choose to use international RF-EMF exposure limits is to follow the ICNIRP 2020.

Any questions? This you see all of the princes of EMF, including Emilie Van Deventer that will speak here. Many thanks! Bye-bye!

>> WITOLD TOMASEWSKI: Thank you for the presentation. Maybe they're set to high but I think it depends on the regulatory environment in every country, for example, Poland, you measure the base station during the maximum power, but for example as far as I remember in Italy you measure during the 24-hour period of commercial available base stations. The output would be different. The level only alone is not a good indicator.

Thank you very much.

I would like to produce another panelist, Dr. Emilie Van Deventer, head of EMF project, WHO.

Doctor, the floor is yours.

>> I'm sorry, I think that Emilie Van Deventer a challenge --

>> EMILIE VAN DEVENTER: I'm here. Can you hear me?

>> I didn't see the name.

>> EMILIE VAN DEVENTER: I need to be able to share the screen. Okay, excellent. Can you see the screen? We didn't see it yet.

How do I show just the screen, not the next slide? Okay.

>> We see the screen, not the next slide.

>> EMILIE VAN DEVENTER: Do you see the screen now?

>> Yes.

>> EMILIE VAN DEVENTER: I'm not sure which screen, I have three screens open. As long as you see the presentation that should be fine. Is that okay.

Thank you for inviting me. I wanted to give a simple

overview of WHO's involvement in this topic and to explain to you what we do exactly in the context of the World Health Organization.

The work in the topic of radiation, which includes electromagnetic fields, but also the optical part of the radiation spectrum, infrared, visible spectrum and ultraviolet and many applications from the medical sector, natural sources of radiation and response to and preparedness to radiation emergencies such as nuclear power plants. When we talk about electromagnetic fields and radio frequency field, we define them as applications within the spectrum from 100 kilohertz to 300 gigahertz and you're all very familiar with this different applications, including, of course, telecommunications.

In terms of the present scientific knowledge that we have on this topic, there's a lot of studies looking at the bio reaction of the body, we have data going back now nearly 70 years and the international exposure guidelines that were mentioned by Haim Mazar already based on this established health effects. As always, in science, there is some uncertainty and I'll explain to you why we have such uncertainty.

What we know at present, the direction of the body, it is dependent on the frequency, what happens when you're exposed to fields, in 29G, 3G, 4G frequencies, it is very different from electromagnetic fields that would be regulated or emitted by lower type of applications such as, for example, power lines and electricity.

The mechanisms of interactions are different over the frequency range.

When we talk about RF, we usually mostly talk about heating as the main mechanism of interaction. As you go up in frequency, that heating, it is less and less within the body, but really at the surface of the skin. This is what we know and what we have been looking at over the past 20, 30 years, is whether there are non-thermal effects below -- at the current level of environment levels of exposure.

The international exposure guidelines, which you will hear more about from Rodney Croft are really set up through the electromagnetic spectrum and WHO does not set up guidelines but many countries currently adhere to either the ICNIRP and IEEE levels. These guideline, they're not technological specific, they cover the range of frequencies and in the case of RF, they actually include the frequencies that are and will be used by 5G.

The guidelines provide exposure levels that should not

be gone over and they differentiate between the general public and the exposed workers.

What's WHO doing on this topic? We have a project that was started in 1996 because at the time it was the beginning of the wireless technologies where a number of people were concerned about the possible health effects of the fields. The project is there to investigate the health impact of EMF and to advise national authorities. Our main counterpart is the Member States. What we do is mostly advocate for further research into the impact of the technologies and we also promote and identify research priorities related to public health. We also develop and encourage Member States to develop information material with regard to the technologies.

The way we do the research, it is done by reviewing work done all over the world by researchers and experts that do studies on the populations which we call epidemiological studies and research done experimentally on animals or human volunteers or individual cellular studies. The reason I didn't mention that earlier, there is some scientific uncertainty remaining, an agency of the World Health Organization on cancer evaluate the carcinogenic in the field in 2011 and published the document two years later and classified this field as possibly carcinogenic to humans based on research done with respect to people who were using mobile phone in the late 90s. The evidence was limited. This is why they did not classify the fields as carcinogenic, not probably carcinogenic that's the next classification, but possibly carcinogenic, they see some limited evidence in humans. There was no evidence for exposures from base stations or wi-fi or other outcomes besides cancer. What we have been doing in WHO headquarters, doing the monumental task of reviewing all of the Articles that's been published since 1993, when the last review was performed and looking at all health outcomes, not just cancer but fertility, cognition, different types of symptoms, et cetera.

When it comes to 5G infrastructure, I think you're well very versed into the differences between 4G, 2G, 3G and the 5G and you know there is quite a bit of differences in terms of the technology, not just the frequency, but how the signals are emitted and transmitted to specific people rather than in a more general direction. With this situation, this has created a lot of attention and also certain level of citizens concerned, not in all countries, but in a number of countries and the citizens have been quite vocal so it is ongoing, some review of the scientific

evidence for these frequencies of interest. In particular, I can mention the French agency ANSES, it is currently performing a review of the knowledge and the Dutch health Council of the Netherlands that just published a report a couple of months ago and that you may already familiar with.

We have published a couple earlier this year in February, a set of questions and answers and when it comes to the potential health risk from 5G, what we have said, it is that to date there is no adverse health effect that can be seen from the current technologies and only a few studies have been carried out at the frequencies that we have used by 5G.

>> WITOLD TOMASEWSKI: One minute, please.

>> Yes, tissue heating is the main mechanism of interaction. As the frequency increases, there will be less penetration into the body and it will be really confined to the surface of the skin and the eye. As long as exposure is below the international guideline, we expect no consequence for public health.

To finish the presentation, I want to mention that besides the science, we also have to work on communicating the risk or potential risk and explain what we know and what we don't know. This is extremely important.

To end, the challenge to the government, rapidly evolving RF technology, launched on the market before health evaluation could be done disparities in risk management measures and regulations around the world, country A and country B, they have different guidelines, and we also have to balance this potential risk with the use of digital technologies for health, for example in eHealth or mHealth.

Finally, I would like to mention that 5G really represents a gradual extension the wireless spectrum and what we know currently should be applicable there and this is not new, the use, but the exposure, they're not well-known at present and we look forward to hearing more and learning more, monitoring these exposures as the technologies are deployed.

Thank you very much.

>> WITOLD TOMASEWSKI: We have to talk more about frequencies, not especially about the technologies, but for example if you have the dynamic spectrum share, 5G around it together with 4G, it does not differ than the technology. I think especially the waves of 5G, they're fragile for this information. This is not the technology, but rather the frequency.



Thank you for that great presentation.  
Our next guest is Rodney Croft, Chair of ICNIRP.  
The floor is yours.

>> RODNEY CROFT: Thank you very much.

Thank you for the invitation.  
Let's move on to the first slide.  
Next slide, please.

We may jump ahead of that, we have heard what ICNIRP is about.

Next slide, please.

ICNIRP, a main activity of ICNIRP revolves around guidelines and the whole point of guidelines for ICNIRP is really to provide a method of communicating to the world what is a safe level of exposure. When it comes to 5G, we're talking the radio frequency spectrum and what we want to be able to do is provide clear guidance about what levels are going to be safe. The idea is that at the end of a guideline development process what we end up with is something like this yellow beam. If you're below that, you will be safe, it doesn't matter for you're one meter, two meter, as long as you're less than 2.1 meters you will definitely be safe. This is what we're talking about with the ICNIRP radio guidelines. To cut a long story short, as far as we're concerned, it doesn't matter if we talk about 5G, 4G, 3G so long as we meet within restrictions in the guidelines, this safety will be assured. One difference between the guidelines and this beam is that you can go a lot higher than this beam as well and in most situations there will not be a problem. It tends to be when you get to higher level, much, much higher than the guidelines that problems emerge.

Next slide.

How do we determine these levels? Well, what we do, we start by identifying the lowest exposure level that can cause harm. When it comes to our exposure to the entire body, we're primarily here looking at whole body heating, whole body temperature rise, and what we see, it is that around about 4 to 7 Watts per kil. We'll produce a 1 degree body core temperature rise in humans. In itself, this is not necessarily a bad thing, humans will routinely have a variation over a 24-hour cycle of 1 degree. Because it could potentially be a problem, we treat this as an adverse health effect, we apply reduction factors in the case of whole body heating, reduction factor is 50 for the general public which reduces the level down to .08 Watts per kilogram, much too low to cause a detectable increase in the body core temperature at all. We start off at a

relatively high exposure level, but one that is still normally very safe and then we go lower than that and these lower values after the addition of the reduction factors are what we end up with as our restrictions.

Next.

Looking at it in a different way, what we can see here, exposure magnitude on left when talking about thresholds for whole body heating, for instance, this red box towards the top is really where we find the 1 degree temperature rise, which as I said is normally quite safe. We apply reduction factors and we get to the restrictions which are indicated by the dashed line at the bottom. We have headsets which tend to be -- can reach levels close to those restrictions, but in general, still quite low and we have base station, cell towers which produce exposures which can be between 110,000 times below these restrictions. We're talking about extremely low levels. It doesn't necessarily matter -- sorry -- let me move this off my screen -- thank you.

I can actually control this. Sorry, I didn't realize that. In that case, I shall takeover. Okay.

We have our levels within the restrictions which are extremely safe but the important thing is we still can go higher in many situations and still be very safe. Base condition predict these situations it makes sense that we have a very safe level down at the bottom here that we require people to stay below.

That's how the guidelines work.

What I thought we would do to give more idea of this, looking at the negative, it is really a lot of people after seeing -- it is not working actually anymore! Great.

A lot of people after seeing that explanation say but what about I have seen much in the media, there's a lot more to it than what you're talking about. What I thought I might do is take a quick look at a few of these issues so that we can see the degree to which they are actually important.

Firstly, people claim the guidelines only protect against thermal effects. That's because a lot of numbers are based on the lowest exposure level that can cause harm and that's due to heating effects. The guidelines protect against all effects. If there's any effect at all, it has to be by definition well above the guide line restrictions themselves. Where we have knowledge of a mechanism, such as thermal, it is certainly allowing us to make -- to use a much larger body of science to ensure appropriate restrictions, but if there is anything else there and

certainly we look for everything, and that will include that.

Secondly, people often cite the classification as possibly carcinogenic and they see that as evidence as RF and EMF cause cancer but they don't take cancer into account, but everything is taken into account and the compliance and the process of determining them has looked at literature and concluded there is no evidence that RF EMF causes cancer. If that evidence appeared in the future, then clearly the guidelines would have to take that -- would have to set limits based on that, unless, of course, those levels were higher than the current guidelines levels.

People often complain that certain populations of older people, younger people, people that report electro hypersensitivity are not covered by the guidelines. This again is not true. The guidelines protect everybody. It is just that there is currently no evidence that there is a differential be effect of this on health as a function of such things as age, infirmity, self-reported electro hypersensitivity and so forth..

People ask why the studies ignored this harm, in research is ignored, some is excluded because it is not relevant, there are biological affects with no health consequences and that's of interest, of course, any change in kinetics as we expect with an increase in temperature will result in a host of changes within the body and it is only when they effect health that they become relevant to the compliance. Some is not interruptible due to methodological interpretations and some is shown to be incorrect. For instance, someone reports a finding of one study pass, another fail, they both can't be true and in a normal science practice we say the first study was not correct unless further information comes to light and to the contrary.

>> WITOLD TOMASEWSKI: A minute.

>> RODNEY CROFT: Thank you.

It is often claimed that guidelines only consider acute effects, this is not true. Acute and chronic effects are considered, but people often point to claims such as RF causing cancer to show that there are chronic effects which are not considered by the guidelines, the guidelines consider all effects.

Finally, people often claim that we should not be moving on to something like 5G because we don't have the research out there. We don't have absolute certainty. This is a big issue. This steps into philosophy and what

do we actually mean by certainty within science? What we mean by this, having difficulty getting to the next slide. There we go.

What we mean by this, what ICNIRP means is scientific certainty to know that this causes cancer, certain vaccines reduce communicable disease risk and we believe this is the only useful interpretation of certainty. We do not believe that we need a lot more research specifically looking at each combination of frequency, frequency over time and so forth for 5G so long as we have good mechanism understanding of what the change will be in terms of the effect of the RF on the body as a function of frequency, which we believe we do have, and then we can understand what the effect it as was pointed out earlier, penetration depth is reduced as frequency increases, so 5G, particularly the higher frequency, they'll get a smaller penetration depth but the guidelines, for instance, they do not look at the patent, they look for the worst-case scenario so peak exposure and peak temperature rise of what's actually limited in this case and I'll leave it at that.

Thank you very much.

>> WITOLD TOMASEWSKI: Thank you very much for your presentation and the simple words, simple facts against the information.

Our next guest is from Greece, Konstantinos Masselos, President of Hellenic Telecommunications and Post Commission.

The floor is yours.

>> KONSTANTINOS MASSELOS: It is great to be here. I would thank the organizers for giving me the opportunity to participate as a speaker today.

I'm not certain whether you have my -- okay. My set of slides.

5G is a biotech knowledge that's less about our mobile phone and more about everything that's surrounding our mobile phone. 5G is a paradigm shift on how we plan and how we deploy radio networks. It is about rethinking our infrastructure. It is about prioritizing quality and planning and deploying infrastructure.

However, 5G deployments around the world face skepticism and concerns over radio health issues, despite the fact that 5G technology can still help lead in safer radio environment, the spread of misinformation during the ongoing COVID-19 crisis on alleged interlinks between 5G testing and COVID-19 further fueled the discussion. However, the debate on health concerns related to EMF

exposure is ongoing through every generation of mobile technology.

Next slide.

So 5G is more efficient than 4G over a given frequency band to improve data throughput, we port larger, more diverse types of radio spectrum into the 5G specification. 5G requirements imposed significant pressure on network architecture, especially the access part and to overcome the challenges, there is a need for increased total amount of spectrum used, larger continuous standards, use of new frequency bands above 6 gigahertz, use of active antennas, intrigues the access points, architecture so that the user can seamlessly hand over between various access points and flexible use of spectrum between different base stations. There are a lot of technical challenges around 5G.

Next slide.

There are still implications on 5G on EMF that can be discussed, increased bandwidth can increase the total amount of EMF energy transmitted, usage of massive MIMO antennas makes the links a difficult task, the use of wave bands means that higher power is required to overcome the higher absorption in these frequencies. Metrics on mobile phone transmissions levels will increase the need for more dense network, and the use of multiple bands can challenge the operation within EMF limits and denser networks can increase public concerns. A lot of concerns can be raised. These are legitimate concerns, of course, by all means. Unfortunately, amplified by lots of uninformed, partly informed or care less public thinking on what 5G actually is, why sadly applying many times everything 5G, even on the 700 megahertz band we have spent a better part of last century with analogue TV. 5G uses previous networks, and the bands below 1 gigahertz, between 1 and 6 and above 6 are covered by current EMF safety standards and limits. 5G devices and base stations need to meet the same EMF safety requirements as current equipment.

5G uses advanced antennas and beam, beam forming to improve performance while keeping EMF levels similar to those of current networks, well below international standards. For 5G as any new technology to be introduced at scale, we have to stay practical and staying practical on 5G EMF means understanding the components of the public EMF concern, how do we deliver with the antenna deployment. It underscores I believe the fact that none users of a radio link are exposed at any given time to EMF for someone else's convenes regardless of whether or not this is a limited or 0 risk exposure, it makes people feel

uncomfortable it. This mostly reflects on our current experience of planning of past generation, 15 to 50 meters, the antenna, they're enough to go through buildings, some sensitive like schools in order to reach a receiver, almost at ground level 100 meters away, what if we deploy fiber network with smaller antennas with the radiation Plains making all non-public space effectively a 0 EMF zone and further utilizing techniques to make sure that even for the ones along a street, EMF emissions are directional towards the actual radio link and not uniform to anyone in the area. This is also legitimate questions.

Let's move to the next slide, please. I would like to discuss regulatory interventions that are relevant that have taken place in Greece. First of all, in Greece we have established a flexible legal framework for licensing different types of access points, this gives motivation for low emission antennas in the form of simpler licensing procedures. We have established measurements for EMF measurements and the publication of the results and we promote transparency for licensing procedure and connection with the measuring campaigns.

Our commission EETT is responsible for licensing installations of base stations and we are although not directly involving the study of measurements of EMF implication, we are often called to confirm that health protection measures about EMF have been taken into account in the licensing process.

Next slide, please.

The EMF regulation in Greece, Greece follows the E.U. Council recommendation of 99 which is based on the limits set out in guidelines of ICNIRP and further precaution, Greece has said that the limits are 70% of ICNIRP 9 values. However, we'll know that there are updated guidelines from 2020 confirming the appropriateness of the existing limits of the E.U. level to the exposure to EMF with some required adaptations. In Greece every year we perform inside measurements for 20% of all antenna installations in the country and the results are presented through an interactive web portal in which data are constantly updated with the latest station measurements. The EMF emissions from base stations currently observed in Greece are well below the recommended limits.

Next slide, please.

>> WITOLD TOMASEWSKI: Reminder, 1 minute, please.

>> KONSTANTINOS MASSELOS: As I mentioned earlier in one of my previous slides, we have a flexible interlicensing framework in Greece based on an online

system for granting and managing antenna licenses. Part of this is the compliance with the EMF limits and public authorities in the process have access to all of this information.

Next slide.

The key point to our regulatory framework, it is transparency. After antenna license is granted, all information related to the antenna, including the EMF studies are becoming publicly available over the Internet. The online system facilitates citizens to find where the licensed antennas are located allowing also to query for any license antennas in their neighborhood. The system is connected to GIS system of the authority for EMF measurements so that all measurements that have been performed for specific antenna installations can be retrieved.

Next slide, please.

As a conclusion A few days ago, BARAK took a position statement about EMF and the highlights are that the ICNIRP limits are offering -- the EMF issues are appropriately addressed. New measurements methods are welcomed. Transparency is noted. Measures of the monitoring of the equipment operating within the limits and exchange of information and best practices between countries and E.U. Member States is necessary to contribute to a better understanding by the general public.

Thank you. That's my presentation.

Thank you.

>> WITOLD TOMASEWSKI: Thank you very much for updating us of the information in Greece.

Our next guest is from Great Britain, Mr. Fenton, Director of Spectrum Analysis.

The floor is yours.

>> MARTIN FENTON: I can't see the screen or the presentation other than a tiny little box in the corner, hopefully this will go okay.

>> WITOLD TOMASEWSKI: Click into the little small box and it will change --

>> MARTIN FENTON: Thank you. Yes. I have got it back now.

Thank you for the invitation to speak today.

I'm Martin Fenton. I'm from the U.K. Community Indications Regulator and I'm a Director in the Spectrum Group there. I'm also Chair of ITU-R Study Group 5. For the purposes of this Conference, I'm speaking from that point of view of the U.K. regulator.

If we could move to the next slide, please.

What is Ofcom doing in this space? Well, Ofcom as communication regulator can carry out the EMF measurements and audits and we publish factual information about emissions we're adding conditions into the spectrum licensing requiring compliance with the ICNIRP guidelines and the reference level for protection and we respond to misleading information in the media and we can sanction TV broadcasters and radiobroadcasters who breach our rules with the authorities when doing our work.

In the U.K., that body, it is the public health England, PHE, it is the UK lead authority on public health matters associated within EMF and PHEs advice, it is that EMF emissions should comply with the ICNIRP guidelines specifically on 5G their goal is that the -- their belief is that the exposure will be low relative to guidelines and as such, no consequence for public health. We take that into account in how we plan and use radio spectrum in the U.K. If we can move on, please.

We carry out the EMF measurement, we have been doing must have measurements in the U.K. since the year 2020. We have done thousands of measurements close to mobile phone base stations and more recently at the start of this year, very late last year before, lockdown carried on, we started to carry out a program around 5G enabled mobile base stations in the U.K. Prior to lockdown, we measured emissions at 22 locations in 10 cities across the U.K., including the main cities in all of the nations of the U.K. and focused on areas where the mobile use is likely at its highest. These are places like train station, shopping centers, busy thoroughfares and streets and we published the results earlier in the year and we originally published individual test reports for each of the locations but partly due to conspiracy theories stoking up fears, there was vandalism attacks in the U.K. on mobile phone base stations which kind of continue at the moment but at a much lower level, so we decided to remove the test results from the website because it gave away the sites that we have been measuring and we set up a summary set of results. As you see from that graphic there, the bars on left-hand side of the graphic show the emission levels that were measured and the solid line on the right-hand side shows the corresponding ICNIRP limits and you see the emissions are extremely low compared to the ICNIRP guideline general public levels. The highest we have seen was a site at 1.5% In general, they're much lower than 1% of the limits.

Of note, the contribution of 5G frequencies to those measurements was just .039% of the ICNIRP guideline levels.



We're also considering introducing conditions in the spectrum licenses to require compliance with the ICNIRP guidelines for the general public and we consulted back in February, we issued statement earlier this month stating our intentions to proceed with that proposal and we expect to amend virtually all spectrum licenses in the U.K. to add a condition requiring compliance with the ICNIRP general public levels and we expect that to conclude about the middle of next year. At the moment in the U.K. compliance with the general public limits is basically on a voluntary basis. We were going to make that a requirement of spectrum licenses going forward. That's not just for 5G or mobile phone base stations but apply to all spectrum licenses that transmit at powers above 10 Watts. If we can move on.

We also provide simple concise factual information to relevant groups. Recently in conjunction with the government we produced a leaflet on 5G mobile technology that focused on 5G and EMF issues and rebutting claims link and linking coronavirus, local authorities in the U.K., they play a part in the approval of new base stations sites and the installation of new sites and the mobile operators have to seek planning permission to put a new site in and we were seeing in many cases lots of local counselors who have been lobbied by various interested parties to try to prevent the rollout of 5G. We have provided simple information, accessible information to local counselors and the planning authority departments to help them understand fact from fiction.

If we can move on.

We also if necessary respond to misleading information in the media. We use various social media channels to do that.

For instance, in the top right there, you see a Twitter video, our Director gave that information earlier in the year, talking about EMF 5G and the links, misleading link to coronavirus and we respond as we think is necessary to any Mississippi leading information. We don't respond to anything. There's a lot going around. Actually it is counterproductive to get too involved in social media to and fro, but where we think it is necessary, we do intervene and put factual information out into the public domain. If we can move on.

In the same vein, we're the regulator for television and radio in particular where presenters on television and radio news program, for instance, state misleading information about 5G and EMF we can sanction those media

companies and require them to make a retraction or put out the sanctions on them. The aim there is to maintain due impartiality so for instance if a television broadcast focuses on conspiracy theory, but those theory, they're left unchallenged in the broadcast, if we think that they have broken our impartiality rules we can enter fine and require redress.

>> WITOLD TOMASEWSKI: One minute.

>> MARTIN FENTON: I finished my slides there. Thank you.

>> WITOLD TOMASEWSKI: Great! Thank you very much for reminding our guests once more that it is the limits set by ICNIRP and the second thing, it is really the exposure. This is not widely known in the general public and I think it is the message that we'll deliver to the general public. Thank you for the presentation.

The next guest is from Poland, yeah, my colleague from polish national Institute of Telecommunications and they'll talk about a very interesting white paper. The floor is yours.

>> JAKUB KWIECIEN: I would like to tell you a few words about problems that we have identified as a social fear connected with EMF and 5G and some solutions that we tried to take action in trying to solve this issue.

I can't see my presentation.

>> One second.

>> JAKUB KWIECIEN: Okay.

I don't have one k you share your screen?

>> JAKUB KWIECIEN: One moment.

>> Sorry for that.

>> JAKUB KWIECIEN: Do you see the presentation?

>> Yes. Everything is okay.

>> JAKUB KWIECIEN: Okay. So the answer is education, we think that the most important is education and at the basic level. I show on the slide some picture of a kind of man, when young people, when people are young they think that they don't need to learn for example physics, biology because this is knowledge that's unnecessary in the future. Today these people are prone to some stories that 5G causes cancer and that's one example, the lack of education at the beginning can cause that now we need to educate adult persons the same as with languages. When young, it is -- it is easier to teach and when we're older, it is more difficult to learn as adult people.

What to learn and how? As I talked earlier, the most important thing is education at the most basic level and we know that EMF and all of the connected issues, they're very

complicated, the connected technical issues and health issues and at the end, the most important, it is that everyone will take care of their health. The most important, it is having when we talk to someone about technical issue, having in mind that the aim is to talk about this technical with no effects for their health, negative effects for their health.

As it is in the slide, this issue, this EMF issue is very complicated, complicated issue because there are a lot of aspects. We need radiocommunication, we need some part of chemistry, of medicine, maybe some part of physics, physics and telecommunication communication.

What's the problem? We identified some problems, for example, the issues, they're very interdisciplinary. The issue, they're difficult to understand. It is not easy to identify who is our recipients of the information and at the end, it is very easy, now it is easy access to unverified sources of information. Example is the devices, they're very important. I show you on the example the word radiation, radiation, it is transfer of energy through electronic wave, simple math, more or less. Radiation for people with lack of knowledge or new technology, it is identified as -- when you put radiation in the Ground Zero match searching, this is the result of the searching of radiation. I show you the path I think of understanding that some people think that radiation from 2G, 5G cellphones, cellular network, it causes, for example, cancer, it is Ionizing radiation and this is radiation from cellular network is non-ionizing, but radiation from CT or nuclear power plant is ionizing and it is important to show it and to show that this is very big difference. It is to teach and educate other persons, look, that we wrote, it is published by the national Institute of Telecommunication and with cooperation of the Ministry of Digital affairs, the book, the title is electromagnetic field and people on physics and medicines and the 5G network. This book, it kind of a white paper, there are a lot of -- we have a lot of consultants and authors from many institutes and so we have authors from technology, medical universities, from the national Institute of Telecommunication and the Ministry of Digital affairs.

First part, our book, it is divided into four parts, first part, it is physics. We show in this part -- we wrote in this part about natural resources of EMF, about human sources of EMF and we write also about what is EMF what, is electromagnetic wave and the principles and the parameters of the EMF waves and we show all electromagnetic

wave, showing that there are lots of equipment that we use every day, for example, a remote pilot for our garage, it also use this spectrum that's the same electromagnetic wave that's in our mobile phone, for example.

At the end, we explain how it work, mobile phones and the principles of cellular networks, how they work.

The second part, it is about biology and medicine. We talk about thermal effects and all effects of EMF and interaction with the biological system and the scientific evidence, about the IARC classification and about all the classifications. We explain the classifications because it is very important in my opinion.

In this third part, we talk about standards and about measurements, how to measure, why to measure, about limits and methodology. There are a lot of methodology of a measurement.

Last part, about 5G, it is dedicated to do application of 5G of potential applications and the objectives of 5G and we also show the history of the technologies of 5G and the background of 1G through 4G. At the end, I can show you our graphic, it is very -- in our opinion, it is very important to show in attractive way people how to -- how it works and all mechanisms, for example, of the propagation or how cellular works and how cellular network is built for example.

That's all. Thank you.

>> WITOLD TOMASEWSKI: Thank you for that presentation. I encourage everyone to see this document.

Our next speakers are from Serbia, Goran Laovski, Chief Advisor for Fixed and Mobile Radiocommunications and Mr. Nenad Radosavijevic, team lead for the Quality of Service Group who are both from the Republic Agency of Electronic Communication.

>> GORAN LAOVSKI: Thank you.

This presentation consists of two parts, in the first one, I will briefly share with you our achievements and challenges we face of interdevelopment of 5G technology in Serbia, including our regions and plans and regulatory framework challenges and the status of the primary band suitable for 5G and what's really important, is the local exposure to the electromagnetic fields in Serbia versus the ICNIRP standards and we'll talk more details on our project of RATEL.

5G will undoubtedly change the world we know. It changes how we live, work, going beyond broadband and the sooner we understand that, the faster we'll progress.

What is our region? The new technological generation,

it has reached us before we expected and it has the potential of being significant generator of the development of digital and other related industries. 5G in Serbia is important steps going forward but all this is in accordance with the current strategy for the development of new generation networks until 2023 which aims to make Serbia the regional leader in development of digital economy and generation.

Next slide.

Yes.

What have we done so far in order to encourage the development of 5G technology? First of all, the launching of the first 5G base station in Serbia, on the right. The main idea, it is to create a 5G test environment that can be used by domestic and foreign companies, start-up, students of technical abilities to develop technological solution for the future. For that purposes, the temporary spectrum usage in C band, it is 100 megahertz in C band.

Next slide.

Also it is important to mention that Serbian government signed an agreement regarding the Smart City project. The project will encompass the biggest cities in the country and it implies the economic implementation of various services such as public lighting, parking spaces, et cetera. We have the opportunity to join efforts with the future of the connected driving in Europe, they're in agreement, it was signed in Bulgaria, Greece, Serbia to develop an experimental 5G building of testing driverless.

Next slide, please.

What's the basic preconditions for 5G technology introduction in Serbia? This is from a regulatory standpoint, estimated timeline is in the brackets and you can see as well the status and who is responsibility for the adoption. Very important option is the decision of the ministry on the minimum requirements for the issuance of individual licenses and radio frequency, specifying the frequency bands for auction block size and licensed conditions, durations, et cetera. Then we begin the 15 days of the adoption of the dimensions and start that process. It is coming then from the implementation.

Next slide.

The primary band suitable for the 5G introduction in Serbia, it will be 700 and later when the need for more use is indicated. What is the current situation? Accordingly, this is the most valuable frequency band and it is expected to be ready at the end of this year or during the 2021, by the end of the transition period of digital television

broadcasting. 3.4, 3.8, 5G, it a good compromise between capacity and for the gigahertz, there is a need to prepare the plan and we have the next slide.

Yes.

This is low on protection against none ionizing radiation is enforced, that looks at the requirements and procedures for the none ionizing radiation, this is within the Ministry of The environmental protection and the relevant protection agency and also it has been prescribed, the different levels of exposure to non-ionizing radiation that's considered safe for the government's help. What's the role? Local governments should conduct an impact assessment procedure and based on that, they issue a decision approving or not approving the installation of the station. As you see, in the table, the fact is, presence level, many times they're lower than those recommended so this could be a major obstacle to the development of 5G network.

That's all from my side.

Thank you for your attention.

Thank you.

>> NENAD RADOSAVIJEVIC: Next slide. I can't see the slides.

>> Sorry. Coming in a second.

>> (No audio).

>> NENAD RADOSAVIJEVIC: Okay. First of all, thank you for the opportunity, thank you for the opportunity to share this experience and thank you for the opportunity to share our experience regarding EMF and our challenges.

In the next few slides I will present to you our EMF project which was started in 2013. We have witnessed rapid development in barriers to communication around us, it was from all around us and we have more and more numbers of transmitting sources, 5G, 4G, base stations, so on. For one side, this is grit when speaking about industries and so on, but from another side, it is increasing the fear, public concern about the radio magnetic fields, next slide.

That's the reason why, what we notice, what we noted, the missing trust was between one side, operator, another side, local government, and also from our citizens. If we continue to measure the electromagnetic fields on a country level, we can make a success maybe in this mistrust issue. That was the reason for this project.

Please, next slide.

The idea is for long-term project, in the next several year, making history from 2017 to install 100 EMF sensors in 30 cities in Serbia. So we use well-known vendors for

this project and what is also challenging, the sensors will be installed, this is a challenge because we need to find interesting location which can show to our citizens interesting results. That was the reason I didn't we use locations like schools, kindergarten, hospital, student dorms, because this is the will be occasion where we can maybe share knowledge and experience to our citizens in a way that they can understand and maybe they can help us to widely spread information about this. As to be a part of the open project because all our data from all of our locations, they're open and can be used for deeper analysis.

Next slide.

On this slide we can see how the sensor looks like on our location. Left side, it is one elementary school, on another side, it is the one technical science facilitator silt and it is a campus, and in October of 2020 we have 57, currently 62 available locations.

This is what end user sees on a portal. We tried to show as simple as possible, just the results from location. What we had noticed from our experience, we need to try to explain to our end users, to increase knowledge about the topic. The units, they're hard to understand. For example, on the right side, you can simply see the results from one week and the high-level, little bit high-levels during the week and also during the weekend where students are not on campus so it is easily shown. This is important for our users.

Next slide.

>> WITOLD TOMASEWSKI: One minute, please.

>> NENAD RADOSAVIJEVIC: My colleague mentioned the base station, immediately after 5G base station in Serbia are installed, we also installed EMF sensors, selective one, just to measure the levels which come from the C band and also 2.6 band and also what we want to show is that the levels, which are reached, they are several times lower than the reference level.

Next. Our system, it is simple. This is calling for all users for RATEL, one side they see the results and another they see the information that's used for knowledge.

Next slide.

What is our conclusion and key message? Our level what, we reached with our sensor, they're high, high, several times, more times lower than the reference values. This is very important to be shared to all kinds of media, all types of communications with our citizens to understand we're far, far away from the limit.

Next slide.

As I said, our project is part of the government project of open data. In a different format, all results are available for deeper analysis for all purposes. That's one initial, let's say our contribution to development, open data project in general and also in this EMF area.

One more slide more.

That's it. Our projects are still ongoing. Next year, it is planned to install 25 sensors more and because of this we also implement some improvement in also public and the ministry part of the portal, but I want to share that always we mention that we also invite and involve other parties just to be a part of our project to bring a sense of our network and to show to all of the participants and all users and the company, the airport, the stations, so on so, the main focus is on the knowledge and this is a main key message I would like to share with all our citizens.

Thank you very much.

>> WITOLD TOMASEWSKI: Thank you for updating us on the situation, I like how you handle the lack of trust between the general public and the operators and the government.

Thank you very much.

We have less than 30 minutes and three presentation, our next guest is from Italy, full professor from Milan.

>> ANTONIO CAPONE: Thank you very much.

Can you put the presentations on? Thank you. Let's see if I can take control of this.

In the next few minutes I want to tell you my little experience in trying to explain to the members within the Italian parliament the meaning and the effects of the limits that they have for exposure to the human body.

Leading a group of people together with the Italian association of telecommunication industry and my University have conducted the study on the impact of the Italian limits on the development of the 5G infrastructure in the country. In this case, my University acted as a trusted third party with operators in order to receive confidential information and measurements and using them for a monitor to be used for public communication. These results were introduced at a public hearing in the Italian parliament.

Next slide, please.

The goal was to analyze and present in a clear way because in general, the average politicians don't know exactly how the dimensional guidelines and the relation with the rules work, presenting them clearly, what's the impact of this and also make a study in terms of the



characteristics and the costs of the 5G infrastructure of the Italian exposure limits. The work methodology is analyzing the recommendations and to make an exercise of radio planning on the different scenarios together with the engineering teams of the operators.

Next slide.

This is a team. So before me, it had been explained how the international guidelines are set, I won't repeat that. It is based on a systematic review of the literature. You can set a threshold, it is the risk threshold and if you stay below that threshold, you know that there are no evidences that there is any health issue that can create any danger. The five times reduction of the guidelines is what the international level is considered. In Italy, a few other countries, without specific guidance on this decision, 100 times reduction has been taken. Considering the significant evidence, we have 5,000 times lower limit for Italy.

Next slide, please.

If you look at this, in different countries in the E.U., you look at the scale of the power density, the perimeter, that's the only one that's significant, you can see that this is the reduction that you get. Unfortunately next, please, when we communicate these and the national guideline, they're referred to as using the electronic data and there is a function in between of course, you may misinterpret again when you try to communicate these reductions. The average people, they believe that the Italian, for example, Poland as well, they're only ten times lower than the limits that are set by the ICNIRP.

Next, employees.

In order to be effective in communication, I try with my colleagues to set the parallel. This was one of the examples with the maximum weight that can be moved by a worker. There are similar rules around the world, in Italy, the limit is 25kilos, this is the maximum weight you can lever then is the reason why, for example, if you look at the packs, they have 25kilos of weight maximum in this case, 25 kilos is a lot, for me, I have practiced more, so in this case, if you try to move such a weight, so somehow, you don't have any safety margin. Let's try to use the safety margins that we use for the electromagnetic field in the examples. Next, please.

If we apply the five times reduction of the ICNIRP we can say that we cannot move in this case more than 500kilos, that's the safety margin that we have.

Next please.

If you try to apply this to the Italian limit, we may say that the maximum weight you can move is 5 grams. Next, please.

Which means that even a pencil is heavier than this, which is just to prove that write something a risky job in particular if you try to communicate this kind of information to the general public.

Next, please.

It is one part of the work that we try to do, again, using the communication to the Italian parliament but also a number of other instruments, including participation to the public events. The second part, it was the cost of the safety margin, just another aspect that general people planned not to consider. Taking a margin, it may be on the safe side, you know, could be considered reasonable, right. If you don't consider the cost that can generate this on the country. This is the reason I didn't we have been doing an exercise, planning exercise, in order to see how much more will the lower limit cost to the country in order to provide full coverage for 5G network with all of the quality level that you may expect from a 5G network. This has been done consider, of course, the available sites in the country, which is more than 30,000 and see if the limits in the sites had been reached already or not and safety in some specific quality and coverage thresholds in order to define the minimum level of quality coverage that you may expect for the 5G.

These are conservative areas.

Next, please.

There are some interesting results that we have opined. First of all, if you don't allow operators to create new sites and you force them to use existing sites and don't increase limits at the moment, basically you may get a very bad quality of the network because only a very small fraction of course, of the sites available can be upgraded to 5G just because you have reached the limit with the other systems, and of course, you cannot easily turn off previous generation systems considering they're mobile terminals that you have in the country.

Next, please.

>> WITOLD TOMASEWSKI: Reminder, 1 minute.

>> ANTONIO CAPONE: Thank you.

62% of these site, they're not compatible to the 5G. It translates into more than 27,000 base stations in the country. We may decide if we want to have limits or we want to allow operators to install in very large number of base stations in the country, which is something that in

general, the general public don't want..

Coming to the cost -- if he cans -- what we have estimated, in a very conservative way, is that these lower level of limits that we have in the Italian regulation, it will cost the country at least 4 billion more than in the case of international standards set by the guidelines and this is something that will translate sure on the consumers because of course, you know, we foe very well that telecommunication operators are not capable of these solutions.

Thank you.

>> WITOLD TOMASEWSKI: Thank you. I think that's a target that should be addressed with reliable information about 5G and EMF especially. Thank you, Professor.

Our next guest is Henri Haxhiraj, Senior Manager of Business Development and Government Relations.

The floor is yours.

>> HENRI HAXHIRAJ: Thank you very much.

Thank you for the opportunity to be here. It is a great pleasure to be on this panel. In my presentation I will focus more on the challenges regarding 5G and I suppose the specific challenges generally and also for other countries.

Next slide, please.

I have also two slides about the strategy. These are I think discussing the other sessions that are more about challenges for achieving these targets and where there are challenges in the implementation. We launched the five fields of action for 5G, the rollout, the frequencies based on the bands of 2019 and it was between telecommunication and user industry, target and coordinated research and it also allocates roles for 5G research initiative and 5G centers and will support the deployment of the networks and the development of 5G applications, it was an action plan and we have renewed efforts with the services across the digital areas with the coverage.

Next slide, please.

The generational strategy was promoted in September of 2019 and a five-point plan was announced, extending coverage and especially with ways and means to reduce the 4G and expand 5G. The main points of the strategy are to provide strategies about the actual coverage and to fund 5,000 base stations and Germany is planning to establish a mobile infrastructure agency for the government agency to deal with all of the administrative work and for the infrastructure and to put this at the disposing of the operators.

Next slide, please.

To achieve these, there are challenges. For example, connected with the mobile network coverage, the general overview, we have the problem or the challenges that we do not have the actual mobile coverage. For example, we have in Germany an infrastructure of the system and the mobile operators, also they're required to submit data about network infrastructure, this is mandatory. We had program mapping system force where it is on a free basis and the communication provider do upload this data and you see that data in the last mile level detail. Sometimes we have discrepancy compared to the actual coverage. In the project, we're currently working in Germany, we're working with five cars and we have a frequency scanner equipped in every car and we are making measurements and evaluating the measurements on the actual coverage and the results, you see in the photo for example the green part, it is where the mobile station is, the blue part, the green part, that's the connection, it is very strong, the red part, it is not very strong.

You can also see the white spots which is a very good opportunity for planning.

Next slide, please.

Another problem, which mostly government is dealing with, location searches.

So where is the appropriate structure for 5G. In Germany today there are approximately 74,000 sites used for public communication, in order meet the supply requirements, we have had increases in mobile networks and realized new results in the 5G applications outside of the local 5G networks, thousands of new sites must be developed and established by mobile network operators. There was a level of two years to improve the realization of a single bay station. Together with other stakeholder, we contributed to an overview of which type of public infrastructure is convenient from what type of project. They have identified structure potentials and they have looked at market locations and new locations (poor audio quality). We have the antennas and you see from that expansion of micro elevations that are suitable for also new locations but not very suitable for small locations. This is just the basis for authorities to have. Next slide, please.

There are also some legal challenges for the 5G deployment. We had the case in Germany that the permits must be obtained before putting in the base stations and the services, and we have the variations, so the supply of

mobile services and also the 5G networks, additional mobile base stations, there would be a considerable number of existing sites that would have to be upgraded.

As I said, according to the German network operators, from the planning to the construction of the mobile station, so currently we're adjusting the issues at the digital summit of the federal government, different stakeholders from industry and interest groups and we're making a suggestion of how to look at the approval procedures and also another legal challenge, it is the construction planning and building because due to the fact that Germany is a federal republic, we have the implementation in a different form, in different states and municipalities, it would go from building a base station, you need to have approvals. For example, we have the challenges in high rise buildings, along highways, you have these measures and in case of the federal parameters and currently we're checking out if this can be reduced with more mobile stations to be placed.

Next slide, please.

I saw in the chat group an interesting discussion on communication and this is also a topic with a lot of municipalities and also authorities in Germany, what they're dealing with.

I think that this is mostly an issue for the local governments because they are the one who are conforming with the general public. For this, we're developing a free 5G web application to help with the decision makers in dealing with 5G. In this application, you can identify the stakeholders who are the stakeholders for the 5G network and we have funding possibilities and you can see if there is funding available and also very important, the communication band. I think it is very vital to start very early to offer transparency and in this way you can take people and offer proper communication and in this way, I think it is done in the communication part.

These are some of the current trends.

>> WITOLD TOMASEWSKI: A remind, 1 minute, please.

>> HENRI HAXHIRAJ: Thank you. These are some challenges which we're working on. We have, of course, the challenges that 5G mobile base stations need to have the fiberoptic backbone which will take some years in Germany to be a reality..

Overall, there's a lot of work left to be done. Thank you very much.

>> WITOLD TOMASEWSKI: That are for updating us on the situation in Germany, a very comprehensive way to talk

about 5G, some local site, they're afraid of the massive infrastructure but on the other hand, they want to have the region of 5G mass there.

Are two ways -- to sides of the same situation and very, very great thanks for the presentation.

Our last, Mr. Uwe Baeder, Director of International Relation, ITU/UN.

The floor is yours.

>> UWE BAEDER: Hello. I hope everybody can hear me well.

Good afternoon. My presentation, I want to discuss a little bit of the measurement aspects. We have talked a lot about the EMF as such and I wanted to go on what are the solutions we have to prove that these EMF limits are kept.

We already had the discussion from the World Health Organization and it is important topics. This is my entry to say that we see on the side of WHO that 5G is a topic and what we heard and discussed before, this is an important task to give more information to the public to answer any kind of doubts with science and with measurements and so to convince people that 5G is not a risk or an issue for their health.

Next slide.

EMF standardization, that's one of the keys. When you want to compare limits, guides, then you would need to have a common view of how this is done. If we look into it, we discussed it a little bit and in different talks today it depends on frequency field strengths of power density, exposure time and how much of this or how many of the sources you have in the environment.

So we have a lot of international recommendations in this area, how to do that, how to keep up with EMF and one of the problems, of course, it is the regional limits and measurement procedures differs between countries. The challenge is not the physics, because the physics are fact, it is more that you have no standardized test procedures right now for 5G. You have standardized limits, but not directly written for 5G in many cases. Then you have many national guidelines which may differ from country to country.

This is an overview, I don't want to talk too much about this, we have discussed the ICNIRP guidelines and discussed different standardization efforts and in our introduction we had my dear friend Haim Mazar discussing that and so I don't want to go into that. It means that you have to look into a lot of different paperwork to come

up with a view on EMF. On top, you have a lot of different national standards apply, which are partially more strict and we heard that this may cause interdeployment for 5G some issues in some countries.

Go to the next slide.

When we look into the scope of the EMF measurements, it is a field which you can do a lot of different approaches, you can measure in door, outdoor, short, long-term, you can do comparison of different transmitters and data for the public. For example, when I believe when we looked into the measurement campaign from Serbia, it was mainly collated to measurements to give numbers and to give values to the public in terms of overall assessment of the EMF exposure. The same is with statistical data. In many areas, you have acceptance, you needed to prove that 5G bay stations were conformed with regulation and this then goes to an individual bay station and this is a topic that we're looking in because from our point of view, we believe that to ensure that your installation is correct, you need to have some measures to prove from the transmitter, from the individual transmitter that you are in the limits and to do the deployment in a safe way.

Of course then the challenge from the 5G side is the flexible nature and maybe we could go to the next slide. This is getting a little bit differences of 4G and 5G, I want to rest a little bit on the red parts there. In 5G, one of the main things there that are different for 4G, it is the beam form, it is a new quality and it is interesting, I thank you for the queue from the moderator, Mr. Witold Tomaszewski, to give the dynamic spectrum sharing, when you deploy 5G in the 4G area, when you take parts of the spectrum and you do that in different time slots, you use the same antenna infrastructure as in 4G, so we're just transmitting that 5G signal. So from the sense of beam forming, there is no difference and would hardly be a difference in the exposure between these two forms of transmissions if you use 5G over a 4G antenna infrastructure. However, 5G gives you the benefit of beam forming and this gives you also then the real gain that 5G can deliver in terms of more data rate and better spectrum usage.

Of course, you have the frequencies, you can go a little bit more up to the 6 gigahertz, but that's not so much the difference between 4G and especially this new frequency ranges in the wave here and the beam form is even more important, because in this, you have more and you have to copy with that with the beam forming to get a certain

coverage. It is an important part. Some maybe last detail, but that's more for the experts, it is one of the main differences is 5G is that you have not always all of the symbols. In 4G you can always expect that you have a kind of let's say signal structure which is always oncoming from reference and this is a total different concept than 5G where you only have the blocks that are always on.

Next slide.

This is technical background of it as explained before. The interesting part in 5G from our point of view, the challenge for the measurement, it is the beam forming, it is that you need a different strategy to assess the exposure limits. We do it in a way where we do a power measurement, for example, you cannot decide on which beam you are measuring and which area of the base station is right now, you can work with test modes but even if you simulate full load, how would you simulate that this goes on the beam with the maximum beam forming.

One approach is now -- it has been published for example by the federal Institute of Methodology from Switzerland, that you do a code based measurement and you have a measurement that could receive and distinguish and separate the different synchronization blocks so that you can assess them and I can combine them and then, of course, in this measurement approach, you would need priority information from the operator, from the configuration from the beam of the base station and then you can assess the EMF exposure for the base station and those assumptions. This addresses specifically the 5G new base stations with adaptive technology systems.

Thank you from this perspective. Very important to work on this, we come up with good measurement solutions, there is work to do as we have accepted the standardized approach to it. Thank you very much.

>> WITOLD TOMASEWSKI: Thank you very much.

I would like to thank every participant for sharing with us a lot of interesting information, it is a pity that we have not had the opportunity to talk about the efficient delivery of the messages to the general public. Maybe next time!

>> Thank you very much, Mr. Witold Tomaszewski for the excellent moderation.

I would now hand over to the Chair of the event, Jaroslaw Ponder. Please, the floor is yours.

>> JAROSLAW PONDER: Thank you very much for this. Dear ladies and gentlemen, we're running to the end of the event, it was really a great review of what's happening in



Europe but also touching upon some developments in the other regions, we were joined by so many stakeholders that those wanted to learn from Europe what's happening in our space and what could be borrowed or what could inspire the developments in the other regions. Thank you very much to all of the colleagues and stakeholders.

So we're still awaiting the Minister to join, just in seconds.

>> His Excellency is with us.

>> JAROSLAW PONDER: Excellent. If the Minister is with us, Excellency, I would like to invite you to deliver the closing remarks for this event and the floor is yours.

>> MAREK ZAGORSKI: Thank you very much, ladies and gentlemen.

First of all, I thank all of our participants for joining us. I hope it was a good experience despite the fact that we were not able to meet in person as we were looking forward to welcome you.

I would also like to thank ITU management and the ITU staff for excellent cooperation with our team on the way to organize this event. I'm glad that is materialized in this format and we had a chance to discuss issues that are perceived to be of utmost importance in the current situation. There were many good points during the Conference, but I would like to go back to what I believe remains the underlying cornerstone and the ultimate goal of our work, that's connectivity.

In the format of this forum itself, it is just proving how important connectivity remains the connectivity that's not totally modern, but available for all. We know without connectivity there is no way to contact a doctor that's timely and a mother to apply for a job meeting deadline. We are not able to study and to connect with our family. I believe that 5G technology, that this information, the emerging technologies, it seems to be reaching an all-time high. Therefore I would like to take this opportunity to express my deepest thanks for creating this conversation, especially concerning the effects of the exposure to the electromagnetic field and fifth generation technology. The effects of this information, it is critical to telecommunication infrastructure despite the best edge legislative, nonlegislative measures undertaken by the E.U. to deploy 5G network, it appears to me that we need to increase our efforts on the front. It is important to educate now and there is an urgent need for implementing communication strategy providing reliable information to the citizens as well as awareness raising campaigns

regarding 5G and EMF. This question on effort, it is needed to not only be within the E.U. but globally.

I truly hope that this forum helps us to make one step in the right decisions or in the right directions and that exchange of good practices will continue among all the administrations and all stakeholders in overcoming efforts to have best policies towards the implementation of 5G technology. Again, thank you to all for organizing this meeting, for participating in the meeting and I hope it will be good to see you in person as soon as possible. I hope it will be very soon.

Once again, thank you very much.

>> JAROSLAW PONDER: Thank you for the kind words and excellent summary of the discussion, transforming the discussions and the proposal for the concrete actions and the call for engagement in the very important development in our region which can serve us in the future in addressing some challenges like those related to the pandemic.

Thank you very much one more time for a great collaboration on this project and we're looking forward to the constant cooperation.

Also on behalf of the ITU, we would like to thank all institutions which are engaged in this activity. We had tremendous and great set of speakers representing the European regional institutions and representing the European Union and BAREK, GMSA, digital Europe, so many countries, Member States, also we learned a lot from the 5G observatory review, on the trends going on in the E.U. countries and also we had the opportunity to launch two excellent reviews on the implementation with the 17 case studies from the 17 non-E.U. countries and the background there on the EMF which we hope will be complementing the other materials, include including the information presented by the Republic of Poland today.

Let me thank the three sectors, they were working with us hand in hand in order to ensure that all aspects are taken care of in the proper way and the results of the meeting are contributing to the work of the whole Union and not only of one sector. Thank you very much.

Before I close, I wanted also to underline that our journey is not stopping here. The next step will be our flagship meet meeting happening on the 11th and 12th of November, we'll be addressing issues related to the standardization and our strategic implementation of 5G and the regulatory discussion related to 5G will continue at the 5G regional forum which is follow-up to the GSR and

will be held in November.

Thank you to the 260 participants from 70 countries which joined during the last two days and this meeting. I think it was a great demonstration of 5G on top of the agenda of so many stakeholders and thanks to the great collaboration we're able to take a little bit of reflection on what has to be done in order to reinforce the efforts and also address any kind of the challenges in front of us.

One more time, thank you very much. I would like to as the Republic of Poland is a supporting partner and the virtual host of the event, I would request Excellency to officially to close the meeting. Excellency, I'm handing over to you for the clearing of the meeting.

>> MAREK ZAGORSKI:

In line with our protocol, we would request you --

>> MAREK ZAGORSKI: I had a problem with the connection. Thank you again very much. The Conference is closed.

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