

Frequencies for 5G - consultations concerning radio spectrum management

- summary of consultations

Contents

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1. General information

During the consultations, opinions were submitted by

- 1) Telbeskid sp. z o. o. (confidential),
- 2) Orange Polska SA,
- 3) ZIPSEE Cyfrowa Polska,
- 4) Ericsson sp. z o. o.,
- 5) T-Mobile Polska SA,
- 6) Emitel SA,
- 7) KIGeIT,
- 8) P4 sp. z o. o.,
- 9) WBZC,
- 10) Exatel SA,
- 11) Netia SA,
- 12) PIRC,
- 13) PIIT,
- 14) Polkomtel sp. z o. o.,
- 15) Piotr Paprzycki Z.A.E. FERLAB.

The opinions submitted indicate a diverse approach both to the issue of 5G network development and to frequency distribution.

2. Answers to questions (slide 28)

2.1. Pilot project

Table 1. Should pilot projects be carried out in one municipality, many municipalities or in another area - which one?

	opinion
Orange	<ul style="list-style-type: none"> ▪ in various locations and environments, not only in highly urbanized areas ▪ operators and suppliers plan individual tests of the key 5G components (in their laboratories, at selected base stations and other facilities) before a possible joint pilot project
T-Mobile	<ul style="list-style-type: none"> ▪ they should not go beyond the area of a municipality or several municipalities ▪ pilot projects possible in more than one area
P4	<ul style="list-style-type: none"> ▪ depending on the tested band, the given pilot project can be carried out in one municipality, provided that it meets the conditions of appropriate density of terminals and is sufficiently populated (there is a city with the min. of 20,000 residents)
Polkomtel, Netia, KIGeIT, PIRC	<ul style="list-style-type: none"> ▪ at the current stage it is not possible to clearly indicate the area of (any possible) pilot project, it seems however that this will be the area / areas of many municipalities ▪ if a site for a pilot project is designated by the administration - this cannot be done without

	prior arrangements with operators, and the decision on designating such a site should be preceded by a detailed analysis, including frequency or infrastructure availability
Emitel, PIRC, PIIT	<ul style="list-style-type: none"> Operators should be able to choose the test area from limited "urban" islands through larger areas, such as cities and municipalities
Exatel	<ul style="list-style-type: none"> pilot implementation of 5G in Łódź should be based on the model of sharing the infrastructure of one 5G network, and this pilot project should be co-financed from the state budget implementing a state-supported pilot project in Łódź does not exclude the possibility of pilot projects in other cities, even by 2020 (e.g. cities with various terrain relief - e.g. Nowy Sącz and Przemyśl)

Table 2. What do operators think of pilot projects by 2020?

	opinion
Orange	<ul style="list-style-type: none"> the issue of selecting infrastructure providers, the way of implementing 5G in test areas (NSA / SA) and financing the costs of joint pilot project is an open issue in the field of joint tests, it will be more beneficial to carry them out using several test installations covering limited resources (2-20 base stations) than to build one large pilot installation conducting a full E2E pilot project of services offered by the 5G network is conditioned by the completion of standardization work, the availability of test bands, infrastructure readiness (hardware and software in the production version)
T-Mobile	<ul style="list-style-type: none"> uninterrupted operators' access to frequency resources within the 3.4-3.8 GHz range should be ensured - also during the "transitional" period, i.e. until the target distribution and allocation time, on the basis of which potential pilot projects will be carried out a failure to ensure uninterrupted operators' access to frequency resources prevents a long-term pilot project combined with a gradual implementation of a commercial offer
P4	<ul style="list-style-type: none"> conducting pilot projects that would start by 2020 is justified the 5G architecture model remains unknown (stand-alone, non-stand-alone), possible to implement by 2020, when not all specifications and standards have been approved and adopted by standardization bodies (3GPP) the availability of terminals in the pilot bands is important (in 2019, terminals supporting the 3.7 GHz band are expected with the appropriate frequency block width - 5G pilot projects in the eMBB range)
Polkomtel, Netia, KIGEIT, PIRC	<ul style="list-style-type: none"> the development of radio systems is hindered by such barriers as administrative procedures (e.g. construction), excessively restrictive PEM levels) administration should support the operator conducting the test or pilot project
Emitel, PIRC, PIIT	<ul style="list-style-type: none"> pilot projects by 2020 will allow the recognition of organizational and technical barriers and will enable the development of ways to overcome them an element of the promotion of new solutions (building demand) - a skilfully conducted information campaign will enable reducing the fears of part of the society of building further base stations the goal of pilot projects should be a comprehensive verification of the technical and formal-legal environment particular attention should be paid to the new type of altitude infrastructure expected in densely populated areas requiring the densification of mobile networks (such as lighting columns, building façades, advertising pylons, roofs, etc.) the element that streamlines pilot projects and the subsequent implementation of the

	network will be social education on 5G solutions, including low-power systems
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Table 3. What would be the basis for the given entity to be ready to implement a pilot project?

	conditions for pilot projects
Orange	<ul style="list-style-type: none"> ▪ agreeing on the scope of tests (areas, scale, duration) ▪ providing appropriate frequency resources for testing purposes ▪ the possibility for equipment suppliers to provide solutions that meet the 5G network requirements ▪ limiting restrictions on PEM standards ▪ involving partners with appropriate terminals
T-Mobile	<ul style="list-style-type: none"> ▪ free access to the existing telecommunications infrastructure of operators, including obtaining adequate backhaul resources offered on preferential terms, ▪ the availability of frequency resources, in particular in the 3.4-3.8 GHz range ▪ openness to cooperation exhibited by public administration / self-government authorities, including the dedication of a team (s) of public administration / local government staff appropriately empowered to prioritize the assigned tasks, including legal / administrative solutions ▪ the availability of potential clients, entrepreneurs, other interested entities (IT developers, start-ups, etc.) that can test the proposed solutions in the real 5G network environment ▪ the possibility of testing various categories of services and applications (use-cases) ▪ the possibility of temporarily increasing PEM standards (at least for the duration of pilot projects, while ultimately it is necessary to ensure a change of PEM regulations in this respect)
P4	<ul style="list-style-type: none"> ▪ radio spectrum available throughout the entire band for the entire duration of the given pilot project ▪ no fee for the frequencies used for pilot projects ▪ the maximum power density limit in places accessible to the public should be harmonized with the values recommended by the WHO / ICNIRP (as in the EU) ▪ the newly established and modernized base stations should be subject to a shortened investment process in which obtaining the necessary permits would be simplified (e.g. installation notifications could replace the building permit (as for installations up to 3 meters), and waiting periods would be shortened, e.g. from 30 days to 7 days)
Polkomtel, Netia, KIGETT, PIRC	<ul style="list-style-type: none"> ▪ necessary support of government and local government administration ▪ it is advisable to locally move away from restrictive PEM limits to the limits of Recommendation 1999/519/EC
Emitel, PIRC, PIIT	<ul style="list-style-type: none"> ▪ it will be necessary to simplify and speed up procedures in the area of access and / or construction of 5G infrastructure facilities ▪ harmonizing the Polish and European PEM power density limits and its measurement methodologies is an element without which it will be very difficult to carry out pilot projects, and it will be virtually impossible to rationally implement 5G technology

Orange: Cooperation of entities and individual tests.

Emitel, PIRC: Emitel can support the entities conducting tests, providing, where possible, passive infrastructure (masts, poles) for the installation of active network elements and taking over part of the tasks related to system installations and can conduct a complete pilot project providing an open network in the indicated area - preferably urban, highly-urbanized (providing the service providers with a platform that it would build itself in the NaaS model (Network as a Service)) - it is necessary in this case to secure funds that would cover at least some of the costs of such a pilot project.

2.2. Models of 5G network development

Table 4. What is the preferred model for building a 5G network (one network, many networks, or extending the existing infrastructure)?

	700 MHz		3.5 GHz		3.7 GHz		26 GHz	
	one	many	one	many	one	many	one	many
Orange		X		X		X		X
T-Mobile		X		X		X		X
P4		X		X		X		X
Polkomtel, Netia, KIGEIT, PIRC	X			X		X		X

Orange, T-Mobile: commercial cooperation

P4: in order to take advantage of the synergies with the existing installations and enjoy the benefits of early start-up in a non-stand-alone version, 5G pilot projects should use the existing infrastructure, which will certainly accelerate testing and the final implementation of services, and will lay the foundations for subsequent versions of the network architecture

Polkomtel, Netia, KIGEIT, PIRC: one network on capacitive bands is pointless, one network for 700 MHz (a state or state-controlled operator)

Emitel, PIRC: a hybrid model of 5G network development (use and extension of the existing infrastructure and an addition of a new, lower layer of altitude objects and networks)

Exatel: development by a consortium of major operators and suppliers, a State Treasury company as the leader

ZIPSEE: sharing a 26 GHz band / network in a case of limited spectrum

2.3. Frequencies

Table 5. What should be the order of band assignment?

	700 MHz	3.5 GHz	3.7 GHz	26 GHz
Orange			1	2
T-Mobile	3		1	2
P4	3	1b	1a	2
Emitel, PIRC	3		1	2
Exatel	2		1	
PIIT			1	2

ZIPSEE

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Polkomtel, Netia, KIGEIT, PIRC: the order should result from their availability and take into account the following: existing rights to use frequencies, technology development, and international environment

ZIPSEE: fixed lines must be removed from areas where 5G is to be deployed, such as cities

Table 6. Should some of the bands be assigned jointly (e.g. 3.7 GHz with 26 GHz), or separately?

	opinion
T-Mobile	<ul style="list-style-type: none"> 3.4-3.8 GHz + 26 GHz is possible 700 MHz (later, in a separate procedure)
P4	<ul style="list-style-type: none"> separately with care for an even distribution and without favouring any entity
Polkomtel, Netia, KIGEIT, PIRC	<ul style="list-style-type: none"> 700 MHz - a separated network without a selection procedure 3400-3800 MHz - no need to join with other bands 26 GHz - should be available without a license
ZIPSEE	<ul style="list-style-type: none"> 3.4-3.8 GHz and 26 GHz, if separately, without excessive delays in the assignment process

Table 7. Should frequency licences be nationwide, regional or local?

	700 MHz			3.5 GHz			3.7 GHz			26 GHz		
	POL	REG	LOC	POL	REG	LOC	POL	REG	LOC	POL	REG	LOC
Orange										X		
T-Mobile	X			X			X			X		
P4	X			X			X			X		
Polkomtel, Netia, KIGEIT, PIRC	X			X			X					X
Emitel, PIRC	X											
PIIT	X			X			X					
ZIPSEE				X			X			X		

Orange: 26 GHz - at least 1600 MHz should be allocated for nationwide licences (4 licences, 400 MHz each), or better - 2400 MHz (4 licences 600 MHz each) - the remaining part of the band can be designated for regional needs or unlicensed use

P4: f> 27.5 GHz - nationwide, regional and local

Polkomtel, Netia, KIGEIT, PIRC: 26 GHz - or unlicensed

Emitel, PIRC: higher frequencies - regional and local licences should be taken into account (e.g. limited to powiat, municipality and even city area)

PIIT: highest frequencies - one can consider separating a small part of the resource for local licences (increasing network capacity in large agglomerations)

ZIPSEE: 26 GHz – regional as a last resort

Table 8. What should be the minimum widths of frequency blocks for the individual bands, and what should be the maximum width of a block granted to a single entity?

	700 MHz		3.5 GHz		3.7 GHz		26 GHz	
	min.	max.	min.	max.	min.	max.	min.	max.
Orange			50 MHz	100 MHz	50 MHz	100 MHz	200 MHz	600 MHz
T-Mobile	2x5 MHz	2x10 MHz	10 MHz	100 MHz	10 MHz	100 MHz	200 MHz	1 GHz
P4	5 MHz		60 MHz		60 MHz		200 MHz	
Polkomtel, Netia, KIGEIT, PIRC	5 MHz	whole	5 MHz	100 MHz	5 MHz	100 MHz		
ZIPSEE			100 MHz	100 MHz	100 MHz	100 MHz	1 GHz	1 GHz

T-Mobile: 733-758 MHz should be allocated to SDL and assigned along with the 700 MHz band

P4: the maximum block width should be determined on the basis of a reliable analysis of the market situation and competitiveness of services (e.g. the optimal, and at the same time the maximum block width for 3.4-3.8 GHz is 100 MHz)

P4: the minimum width f> 27.5 GHz - 200 MHz

Polkomtel, Netia, KIGEIT, PIRC: The maximum block width 700 MHz - 2x30 or optimally 2x40 MHz (Polkomtel, KIGEIT, PIRC) / 2x30 or, 2x30 + 20 SDL, 2x40 MHz (Netia) - for a dedicated operator

Polkomtel, Netia, KIGEIT, PIRC: The minimum block width for the 26 GHz band - no technical document (the minimum values for other bands are provided on the basis of technical documents)

2.4. Other bands

Table 9. Should other bands (in particular 1427-1518 MHz, 2300-2400 MHz, 3800-4200 MHz, 26.5-27.5 GHz) be considered for the purpose of 5G apart from the baseband?

	1427-1518 MHz	2300-2400 MHz	3800-4200 MHz	26.5-27.5 GHz
Orange	X	X	X	X
T-Mobile	X			X
Emitel, PIIT	X			
ZIPSEE				X

Orange: The bands have the chance to be a subject of an international - European agreement at the CEPT level, or a global agreement at the WRC level

T-Mobile: 1427-1518 MHz - postulated intensive work on the rapid release of this range

T-Mobile: 2300-2400 MHz and 3800-4200 MHz - the frequency ranges are not currently considered as primary (availability dependent on 5G services)

T-Mobile: 26.5-27.5 GHz - from the Ministry of National Defence

Emitel, PIIT: 1427-1518 MHz - definitely yes

ZIPSEE: 26.5-27.5 GHz - from the Ministry of National Defence (e.g. in cities)

P4: other bands should also be considered, the President of UKE should strive for the fastest possible availability of frequency resources identified as key for 5G

Polkomtel, Netia, KIGEIT, PIRC: all of the bands listed in the 3GPP specification in the "Operating bands" section marked from n1 to n84 should be ultimately available for 5G.

Exatel: other bands should be used to develop 5G networks. It will be necessary then to develop a plan for using the 60 GHz band

3. 700 MHz (slides 2-5)

The most important postulates and comments submitted by **Emitel, Polkomtel, Netia, KIGEIT, PIRC** and **PIIT**:

- there is no information on the schedule of TV stations switching-over domestically;
- channel assignments to specific multiplexes are missing;
- there is no information when the regulator intends to start selection procedures for licensing of frequencies for multiplexes 5 and 6;
- discussion about the change of the TV signal transmission system to DVB-T2 / HEVC is necessary (there is no detailed analysis of the structure of licensing, patent and software costs necessary to bear before using HEVC);
- surprisingly, there is no willingness to take advantage of the derogation by 2022 for the 700 MHz band release, especially that some EU countries declare the end of the DTT migration from the 700 MHz band by June 2021 (Malta) or June 2022 (Lithuania, Latvia, Italy);
- there may be a situation in which the 700 MHz band will be taken away from TV operators, and it will not be able to be made available to telecommunications - it will lie fallow;
- we should strive not only to conclude "television" agreements but also to renegotiate the ARNS agreements;
- the new channel assignment for particular multiplexes will require the reconstruction of a significant part of the network, including such elements as: antenna systems, power combiners and the addition of new emission facilities - this will therefore be an expensive process;
- the release of the 700 MHz band will require bearing the costs associated with it.

4. 3400-3600 MHz (slides 6-9)

The most important postulates and comments made by **Orange, T-Mobile, Polkomtel, Netia, KIGEIT** and **PIRC**:

- artificial division of the 3400-3800 MHz band into two sub-bands;
- the C band (3400-3800 MHz) should be considered jointly;
- the 3.4-3.8 GHz band should be covered by one selection procedure, despite the fact that individual bands will be made available for real use at different dates;
- as it is used to a small extent and only locally, the 3400-3600 MHz band should be re-arranged after the 3600-3800 MHz band;
- it seems that reshuffling the existing users should allow earlier (than in 2025) release of some resources - it is important, however, that this should not be done in isolation from the 3600-3800 MHz band, and that the proposed split (4x100 MHz) should cover the two bands in whole.

FERLAB's opinion:

- many operators have already chosen, at the pre-investment stage, systems that are already de facto compatible with 5G, for example: WiMAX™ 802.16e base stations whose native channel width is 10 MHz (with the possibility of merging into blocks) in the TDD mode, which already in 2009 resulted in a transmission rate of 40 Mbit/s at the QAM64 modulation and the MIMO application, using a channel with a width of 10 MHz within a cell radius of 15 km (and with good conditions – 30 km) - the maximum speed to the Subscriber in measurements usually not lower than 30 Mbps because client stations enable roaming, mobility, aggregation of bandwidth from the "seen" base stations
- the operated system achieved 4Mbps / MHz performance already in 2012 (and even earlier, in 2009 during tests in the manufacturer's laboratory), while 6 years later, in June 2018, the Regulator submitted a report on "Successful 5G tests at the BEREC plenary meeting in Poland" on its website on June 14, 2018. During the tests, *"we managed to achieve a transfer rate of 375 Mbit/s in the 100 MHz radio channel width"* - the spectral efficiency achieved during the above-mentioned tests was 3.75 Mbit/s - less than the spectral efficiency of the system operated since 2012 by FERLAB - and by many other operators - called WiMAX™ 802.16e, which was 4 Mbit/s
- many operators operated systems currently compliant with 5G already in 2012 - this was made possible in those years by the Regulator thanks to the assignment of 3.5 MHz frequency blocks in the form of 3 adjacent blocks so that the systems could work in native 10 MHz channels
- in wider channels, the WiMAX™ 802.16e system would have even greater performance (e.g. in laboratory tests, the system achieved a performance of over 100 Mbps in a 20MHz channel), but channels with a larger width, due to the already occupied spectrum, were not available (and currently they are also not available)
- in the first place, the Regulator should start the procedure for verification of the existing radio access systems based on their spectral efficiency, because in fact, before 2005, systems were based on the current 3.5MHz band plan and were inefficient in terms of spectrum and energy
- it is reasonable for the Regulator to initiate the procedure for rearranging frequency resources in order to ensure coexistence of the already functioning 5G-de-facto-systems as well as the newly implemented systems, i.e. aggregation of the frequencies already used by operators so

that they could continue to provide services without compromising the parameters of the services, as well as implementing new (wider) frequency bands for tests of the newly emerging systems

- considering that the Regulator anticipates the expiration of most licences / radio licenses in 2026 and only then provides for almost full "release" (up to approx. 30%) of the frequencies planned for 5G systems, and many operators already have 5G compliant systems, the Regulator should take actions that should result in the issuance of radio licenses for the use of the systems compatible with 5G by 2026.
- due to the fact that the currently-developed systems are more spectrally efficient (developed, should be emphasized), each band available for operators should be divided into:
 - a part for operating the existing 5G systems (the Regulator should aggregate (reshuffle) the frequency ranges used by the operator, which will increase the spectral efficiency of the systems - the wider the frequency blocks the greater the spectral efficiency)
 - a part for testing new systems and operating the new systems - the smaller the radius of the cell, the higher the bandwidth of the radio channel per subscriber. However, launching a large number of low-power base stations (allowing sharing a given radio channel among multiple base stations in a given area without mutual interference) involves high fees for setting up such a base station - a reduction of fees should be considered, which will enable technological progress and development of the 5G network
 - radio licenses for systems currently compliant with 5G (e.g. WiMAX™ 802.16e) should be valid until at least 2026, taking into account the time for frequencies reshuffling (e.g. 3 months to allow reconfiguration of the base stations' and customer devices' frequencies) for the coexistence of the current and future systems
- a refusal to issue licences / radio licenses for such systems will entail digital exclusion of the above 75% of subscribers
- taking into account the benefits for subscribers (and the threat of their digital exclusion), refusals to issue / extend radio licenses by the Regulator should be fully justified by the spectral inefficiencies of the old systems dated before 2005.
- the new radio access systems, compliant with 5G, have been kept in operation by many operators for over 5 years and have been providing access to the Internet, data transmission, IOT, etc. for subscribers who had so far been excluded digitally - in the majority of cases (over 75%), it is the only way to provide subscribers with broadband access to the Internet, data transmission, etc.

Comments by WBZC:

- in the NATO Joint Civil/Military Frequency Agreement, the 2900-3400 MHz band was given the category of the highest importance for the protection of devices used for allied operations - Category A;
- the military party proposes that at every stage of the planned activities aimed at introducing 5G systems into the 3400-3800 MHz band one should take into account the necessary interests of the Polish Armed Forces related to the purposes of national security regarding the protection of radar systems operating in the 3100-3400 MHz band.

5. 3600-3800 MHz (slides 10-19)

Table 10. Comments on the proposed activities

	main postulates
Orange	<ul style="list-style-type: none"> the President of UKE should not issue any new frequency licences or radio licenses in the C band (with the exception of permits for 5G tests).
T-Mobile	<ul style="list-style-type: none"> continuity in the scope of maintaining availability of resources currently used by operators in the transition period (i.e. by 31.12.2022), in particular in the 3.6-3.8 GHz band, for those operators who intend to use the frequency resources currently used by them for 5G networks possibility of extending the licences held by operators (optional, for interested parties) will contribute to the possibility of initiating 5G pilot projects therefore, it is important to maintain an uninterrupted possibility of using T-Mobile Polska licences in the transitional period, through the possibility of extending the currently binding frequency licenses for 3 years otherwise - there is no availability of 5G frequency resources in the transition period - preventing any preliminary activities in 5G range (no resources)
P4	<ul style="list-style-type: none"> abandoning the plan to refuse to grant frequency licences and indicating the Strategy implementation date in advance, allowing the entrepreneurs to verify long-term strategic plans maintaining the Strategy in its current wording can result not only in a number of administrative court proceedings against the President of UKE, but also, among other things, a sudden loss of trust in the authority, a decline in market value, a lower investment level and a significant undervaluation of the 5G frequencies that will be assigned by the President of UKE as part of the planned selection procedures, due to the unresolved and multiplying legal doubts as to the correctness of decisions "releasing" certain resources for the purposes of the selection procedure no predictability of the activities of the President of UKE, cumulated with other problems concerning the investment process in Poland, is another important barrier to the activity of operators and the development of the 5G network in Poland the proposed activities: <ul style="list-style-type: none"> are unnecessary and disproportionate to the planned aims; are unacceptable on legal grounds and ineffective from a competitive point of view; are the most far-reaching ever proposal for regulating the telecommunications market, interference with the rights and obligations of entrepreneurs (the holders of licences); seem to be completely detached from both the current situation in the telecommunications market and from competitive realities and economic aspects a refusal to grant a licence for the subsequent period: <ul style="list-style-type: none"> constitutes a manifest infringement of the acquired rights of the current frequency license holders will shorten the real time of using the frequencies to a time shorter than the period in which the return on investment in the licence can take place can result in the underestimation of the licence value and - in the long term – a dramatic deterioration in the effectiveness of using the frequencies
Polkomtel, Netia, KIGEIT, PIRC	<ul style="list-style-type: none"> the proposed activities are not an approach that provides regulatory certainty or an approach that enables effective and quick start of 5G implementation in Poland the consequence of implementing the approach will be a delay in implementing solutions based on 5G in Poland three large operators have nationwide licences in the 3.7 GHz band - they could start the

	<p>development of 5G networks in Poland before the assignment of resources described in the document (i.e. in 2023) takes place - UKE adoption of such a regulatory strategy in the 3.7 GHz band will result in the exact opposite effect (several years of delay)</p> <ul style="list-style-type: none"> ▪ it should be considered whether in the current legal regime a refusal to grant a licence for subsequent period is consistent with the Telecommunications Act ▪ in the case of Poland, the only real band in which it is possible to develop 5G networks by 2020 is the 3.7 GHz and 3.5 GHz band – adoption of the proposed regulatory strategy effectively thwarts this possibility ▪ allocation of the released fragments for testing purposes, as stated in the document, is detached from the requirements of 5G - 100 MHz blocks are not provided (i.e. the most interesting size for 5G technology tests), and 50 MHz blocks are not there by 2021 - this proves that the overall concept for the 3.7 GHz band is wrong, and does not result in any added value
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Table 11. Proposed actions

	main postulates
Orange	<ul style="list-style-type: none"> ▪ to provide an equivalent spectral situation ▪ the most beneficial solution – termination of all existing licences and radio licenses in the C band (based on the proposed new Telecommunications Act provisions), by the end of 2020 at the latest. Which means: <ul style="list-style-type: none"> ▪ a failure to grant licences for the subsequent period in the case of nationwide licences in the 43 band expiring in 2019 and 2020; ▪ a thorough review of the use and potential taking back of inefficiently used remaining resources; ▪ shortening the licence term for the used resources (potentially compensated). ▪ the above course of action will be consistent with the provisions of Article 53a EEC
P4	<ul style="list-style-type: none"> ▪ re-arranging the band in the form of holders "shifts" within the band (changes) without interfering with the acquired rights ▪ the resources of 3 operators (nationwide) could already be used for 5G purposes (in the case of P4 this was the purpose of obtaining the licence in 2017) ▪ it is necessary to strategically plan the refarming process, taking into account its long-term goals ▪ independent assignment of the 3.5 GHz and 3.7 GHz bands in different periods can result in incomplete effectiveness of the intended process - e.g. within 200 MHz from the 3.7 GHz band it would be possible to separate only 2 licences with the optimal width of 100 MHz (which would not be acceptable from the point of view of competitiveness) or 5 licences 40 MHz each (which would not enable the full use of resources due to technological reasons - the existing subscriber equipment supports the 100 MHz and 80 MHz widths) ▪ in the case of gradual assignment of bands, it should be kept in mind that it should allow licence holders to effectively extend the band obtained in the first "round" of selection in the second "round" (possibility of obtaining licences for adjacent bands at different times) ▪ an additional difficulty is the considerable variations in the validity terms for 3.5 GHz local licences (a gradual release of resources as late as by the end of 2032)
Polkomtel, Netia, KIGEIT, PIRC	<ul style="list-style-type: none"> ▪ band reshuffling in order to allow entities to obtain the largest possible continuous blocks of the required sizes (multiples of 5 MHz) ▪ granting licences for subsequent period, in particular for nationwide licences ▪ preparing a selection procedure for the remaining part of the band, with non-discriminating spectrum caps taking into account the resources already held in a given band ▪ the spectrum resource should be divided into four blocks of 100 MHz each (in the 3400-3600 and 3600-3800 MHz bands)

- in addition, issuing licence decisions supplementing the nationwide resource should be allowed at a restricted area (such an area / areas would include places where operators want to implement 5G pilot projects. Such decisions, issued for a limited term (e.g. 3 years) and limited area, would speed up the effective network implementation)

6. 26 GHz (slides 20-25)

The most important postulates and comments submitted by **Orange, Polkomtel, Netia, KIGEIT and PIRC**:

- one should ensure an adequate level of annual fees for the frequencies in the 26 GHz band - the current rates were set assuming that this band is used only in the fixed service and is currently not compatible with the use of wide blocks in the mobile service (5G network);
- in the case of the 26 GHz band, no technical conditions have been defined so far - either at the European (ECC, EU) or global (ITU) level - it is therefore difficult to determine whether the proposed channel assignment plan is correct or not;
- in the 26 GHz band, there are and will be other systems than 5G used - e.g. radio lines or satellite systems - sharing possibilities have already been described in the CEPT Report No. 68;
- it seems reasonable to adopt the unlicensed model - only such a model will allow an effective use of the spectrum, unencumbered by unnecessary spectrum hoarding by entities;
- this band will not be used on a national scale (it will not be used to develop the coverage of entire areas), but it will be used in specific locations as a technology complementary to fibre-optic links (e.g. for data transmission - type WTTX (Wireless to the X), being an alternative to FTTH in terms of capacity).

WBZC will present its opinion during the next WBZC - UKE meeting.

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