

**Appendix IV. Decisions on Recommendations (DoRs) Matrix for Second Consultation Round**

The following summarises the comments and recommendations received from stakeholders on the Consultative Document on Trinidad and Tobago Frequency Allocation Table (8.3 kHz – 3000 GHz) (Second Round) and the decisions made by the Authority to be incorporated into the final document.

Item	Section	Stakeholder	Comments	Recommendations	TATT's Decision
1	General	TSTT	Telecommunications Services of Trinidad and Tobago Limited (TSTT) appreciates that the Telecommunications Authority of Trinidad and Tobago (TATT) has provided the opportunity for operators to comment on these matters. It should be noted that the comments expressed by TSTT on this document, in no way restrain TSTT from making further comments in the future.		The Authority thanks TSTT for its participation in the consultation process and its comments and recommendations made herein.  TSTT's position is duly noted.
2	698 – 806MHz MOBILE TT16 & TT17  DORs Response TT17	TSTT	TSTT notes TATT's response to our concerns, however, we would like to highlight some inconsistencies in the rationale which results in our continued concern in this matter.	TATT should follow its own precedent and provide for expansion bands for each assignment of 10MHz block pairs, in this way	The Authority has specified the AWS band, within the IMT bands 1710 – 2025 MHz and 2110 – 2200 MHz for network expansion, for PMTS, as a preferred band for pairing with either the US 700 MHz or APT 700 MHz Band Plan. This

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	DORs Response		<p><b>“the Authority takes cognisance of the ITU’s Radiocommunications Bureau Resolution 646, as cited on page 21 of the Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services (November 2017), and the need to consider an allotment to broadband PPDR in the 700 MHz band.”</b></p> <p>TSTT does not object to the allocation of spectrum between 698 and 806 MHz for PPDR use.</p> <p>TSTT acknowledges and accepts this policy requirement. Our concern is that TATT’s solution may not be consistent with the wider regulatory framework and even the spectrum plans the TTFAT supports.</p>	<p>each operator would have a transparent mechanism for access to meaningful addition of spectrum.</p>	<p>has been identified in the <i>Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services</i>, November, 2017.</p> <p>It is also noteworthy that the 700 MHz band is the only band currently allocated by the ITU for broadband PPDR. For this reason, 2 x 10 MHz of spectrum has been allotted to broadband PPDR in the 700 MHz band, to accommodate sufficient spectrum to satisfy both the coverage and the capacity requirements requested by the Ministry of National Security. This approach is consistent with section 42(2) of the Telecommunications Act, Chap 47:31 (the Act), which states: “In the allocation or assignment and re-allocation or reassignment of frequency bands by the Authority priority shall be given to the needs of the State in respect of matters of national security.”</p>

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			<p><b>“The current 700 MHz frequency assignment plan identifies 2x5 MHz, i.e., block A, as allocated for future use.”</b></p> <p>TSTT here suggests TATT consider the rationale of this proposal. This position is nested in TATT's strategy to allocate 10MHz block pairs to three (3) operators. TSTT is unclear how TATT envisages the partitioning of one 5MHz block pair between these three (3) operators at the time that future expansion is required.</p> <p>If TATT considers its precedence in the same Spectrum Plan for PMTS, particularly with respect to the 850MHz band where one would see that the each assignment of 5MHz block pair to operators are associated with its allocated 2.5MHz pair for expansion. Accordingly, it is</p>		<p>The Authority wishes to clarify that this 2 x 5 MHz of spectrum is allocated for future use (see section 4.1.2 – Frequency Assignment Plan in the <i>Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services</i>, November, 2017) and is not limited to only future expansion for PMTS. However, should the future use of this spectrum be determined for the expansion of the PMTS 700 MHz band, the Authority will consider an appropriate competitive licensing approach, based on the number of operators in the market at that time. The AWS band is currently identified for future network expansion.</p> <p>The Authority wishes to clarify that the additional spectrum, up to 2 x 2.5 MHz of 850 MHz spectrum, is assigned for the guard bands for the operators. The quantum of spectrum available to each operator for guard bands is different and ranges from 2 x 1 MHz to 2 x 2.5 MHz, as seen in Table 7: Frequency</p>

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			<p>abundantly clear that each operator has access to the same amount of expansion spectrum, and there should be no contention when that spectrum is accessed.</p> <p>TSTT contends that such a model is more appropriate in emulation in the 700MHz band where each operator with a 10MHz block pair should be afforded a material, contiguous expansion band of between 2 and 5MHz block pairs.</p> <p><b>“The 2x10 MHz allotted to PPDR will be necessary to attain both coverage and capacity requirements, based on the potential use for national security purposes.”</b></p> <p><b>“The discussions held with the Ministry of National Security resulted in the determination that 2x10 MHz of 700 MHz</b></p>	<p>PPDR broadband would be best served from the market. This will result in reduced CAPEX and OPEX by the State as the market is better positioned to provide this service where economies of scale benefit the consumer.</p>	<p>Assignment Plan for the 850 MHz Band in the <i>Spectrum Plan for the Accommodation of Public Mobile Telecommunications Services</i>, November, 2017.</p> <p>Recognising that the primary reason for the additional 850 MHz spectrum is for additional guard bands, it is not appropriate that this approach be emulated for the 700 MHz band, as no guard bands are required, and spectrum for network expansion is already afforded in the AWS band.</p> <p>The Authority notes the recommendation from TSTT and acknowledges that there are cost benefits where PPDR broadband can be provided by a commercial operator; however, there are other considerations, as follows:</p> <p>i. <b>Security:</b> PPDR networks offer security and control benefits. They tend to have requirements that security experts refer to as</p>

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			<p><b>spectrum is needed to support the broadband PPDR services envisaged for national security and disaster management”</b></p> <p>TSTT acknowledges this point, but TATT's position raises a number of troubling questions:</p> <p>1) Why is commercial spectrum being issued to PPDR use? This is not with precedent in TSTT's understanding. Even the example TATT posits in this regard does not provide comfort in answering this question.</p> <p>2) Why is PPDR utilising commercial operator-centric technology to develop a parallel network to that provided by licensed operators? Is this the best option for the access of</p>	<p>Any PPDR CUG network would be better served by not utilising operator centric networks. Accordingly, there should not be consideration of developing carrier LTE by PPDR agencies.</p> <p>There should be realistic considerations of the comparatively limited traffic load a PPDR network would carry compared to commercial networks. As such, there should be the consideration of whether a PPDR Broadband network requires as much as 10MHz block pairs to provide service to its users. The absence of comprehensive</p>	<p>authorisation, authentication, integrity and privacy.</p> <p>ii. <b>Coverage:</b> Commercial mobile networks often concentrate coverage in densely populated areas and/or major transportation corridors. PPDR needs also tend to be greater where the population is greater, but coverage needs can also be wider and less predictable than what can be accommodated or catered for in commercial networks.</p> <p>iii. <b>Reliability (traffic overload):</b> No network is immune to threats. However, one particular concern with commercial networks is that they tend to be overloaded during disasters, to the point where usability by consumers becomes difficult, if not impossible.</p> <p>Studies on PPDR have shown a difference between mission-critical and</p>

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			<p>resources? Could dedicated priority capacity be purchased from operators at a reduced capital burden to the State?</p> <p>3) Commercial operators require a 700MHz spectrum because of its propagation characteristics, given the traffic loads the networks would be required to service (over one million subscribers per network). Is it that PPDR is expected to carry a similar traffic load?</p>	<p>planning data reinforces the wisdom of the suggestion to lease capacity from commercial networks with the economies of scale to absorb these traffic requirements.</p>	<p>non-mission-critical PPDR activities. The use of commercial networks for non-mission-critical services might be less problematic than the use of commercial networks for mission-critical PPDR activities involving the safety of property and human life.</p> <p>PPDR requires broadband wireless spectrum to supplement its mission-critical radio network. The spectrum allocated for PPDR is in keeping with the APT 700 MHz band plan and not the FCC or US band plan.</p> <p>In assessing PPDR application needs for bandwidth and for spectrum, it is helpful to understand the following operating environment described in the ECC Report 199 (ECC Report 199, 2013):</p> <ul style="list-style-type: none"> <li>• day-to-day operations (category “PP1”)</li> <li>• large emergency and/or public events (category “PP2”)</li> <li>• disasters (category “DR”)</li> </ul>

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			<p>4) Does PPDR require a commercial quantum of spectrum to meet its need? 10MHz of the spectrum, using mobile LTE technologies offers downloads speeds approaching 75Mbps. Given the limited traffic demands that a PPDR only network would require, does that spectrum assignment seem excessive?</p> <p>The answers to these questions seem to suggest to TATT that PPDR agencies should either seek:</p> <p>a) To lease capacity from networks developed commercially to meet their communications needs. Operators with additional 15MHz block pairs would be ideally positioned to provide</p>		<p>PPDR is one of the few applications where upstream broadband bandwidth tends to be greater and even more crucial than downstream.</p> <p>The Authority recognises that there are various models of PPDR networks; however, LTE and its successors have become the technologies of choice for PPDR broadband.</p> <p>There is a clear movement among network operators towards LTE and its successors, and away from competing technologies such as WiMAX. Also, the clear preference for LTE by the US FCC, National Telecommunications and Information Administration (NTIA) and the public safety community would likely create critical mass on the manufacturing side.</p> <p>With regard to the cost and benefits of a harmonised spectrum allocation for broadband PPDR, the allocation of spectrum to PPDR in the 700 MHz band</p>

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			<p>such capacity to PPDR operators; or</p> <p>b) To construct a network that would not require as much as 10MHz block pairs.</p>	<p>PPDR agencies should either seek:</p> <p>a) To lease capacity from networks developed commercially to meet their communications needs. Operators with additional 15MHz block pairs</p>	<p>was based on ITU-R Resolution 646 of the Radio Regulations, which encouraged administrations to consider parts of the frequency range 694 – 894 MHz when undertaking their national planning for PPDR applications, in order to achieve harmonisation.</p> <p>The decision to allocate spectrum for a PPDR-only network was not based solely on traffic demands but also recognizing that this spectrum would be used to meet both coverage and capacity requirements.</p> <p>The Authority acknowledges this recommendation from TSTT. However, an independent PPDR network is favoured by the Ministry of National Security as it is more secure and would not contend with public traffic.</p> <p>It is noteworthy that a PPDR network will only have the benefit of 2 x 10 MHz of spectrum for a private mobile broadband network to meet both</p>

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			<p><b>“This is similar to other countries, such as the USA, which have also allotted 2x10 MHz of spectrum”</b></p> <p>This example provided by TATT is quizzical for two reasons:</p> <p>First, while it seeks to reinforce the suggestion for a 10MHz pair, it notably seems to ignore that the PPDR and Emergency Support Eco-System of the US are much larger in terms of manpower, when compared to T&amp;T, which</p>	<p>would be ideally positioned to provide such capacity to PPDR operators; or</p> <p>b) To construct a network that would not require as much as 10MHz block pairs.</p> <p>The US PPDR Broadband network currently services a larger eco-system with a 5 MHz pair assignment. TATT should investigate whether the existing or proposed enhanced PPDR networks utilise either carrier-centric or bespoke technology implementations.</p>	<p>coverage and capacity requirements. A cellular mobile operator will have the benefit of 2 x 10 MHz of 700 MHz spectrum paired with up to 2 x 15 MHz of 1.7/2.1 GHz spectrum, with the 700 MHz band favouring coverage and the 1.7/2.1 GHz band serving to meet any additional capacity demands, in high usage areas primarily.</p> <p>The Authority concurs with TSTT regarding the manner in which the US has utilised its PPDR spectrum. The Ministry of National Security may elect to utilise the 2 x 10 MHz allotted to PPDR in the same manner as the US or differently. It should be noted that the quantum of spectrum is determined not only on the number of users but also the type of services. Most notably, video streaming services will require significant capacity. The quantum of spectrum allotted to PPDR was confirmed with the Ministry of National</p>

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			<p>would justify the spectrum allocation. Further, this allocation is actually two distinct allocations – an initial 5MHz block pair for a public safety broadband network and the additional 6MHz block pair to the First Responders Network Authority (FirstNet). Indeed, TATT's reference actually reaffirms TSTT's earlier reservation that 10MHz block pair for PPDR broadband as suggested by TATT is an inefficient over-assignment.</p> <p>Second, and more quizzically, is that the FCC did not allocate commercial spectrum for PPDR. FCC's commercial bands for LTE services Band 12 (699 – 716MHz/ 729 – 746MHz) and Band 13 (777 – 787MHz/ 746MHz -756MHz), whereas the allocated band for PPDR is 758 – 763MHz/788 – 793MHz. The</p>	<p>Deploying commercial-centric LTE for PPDR in T&amp;T would not result in inter-jurisdiction interoperability (of terminals), as the US PPDR network utilizes frequencies which are divergent from the spectrum plan</p>	<p>Security as necessary to satisfy its planned use.</p> <p>The Authority corrects TSTT in that the US did dedicate spectrum within its 700 MHz band plan to PPDR, just as the Authority has done. The US 700 MHz band plan comprises the 3GPP Bands 12, 13 and 14. The Authority has adopted the APT 700 MHz band plan, which is designated as one 3GPP band, namely,</p>

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			<p>First Net assignment is 763 – 769MHz/ 793 – 799MHz. Neither of these assignments impinges on the commercial spectrum allocation framework as is proposed by TATT. Further, as the US band plan for commercial mobile operations veers significantly from the band plan deployed in T&amp;T, these systems would prove to be inoperable – operating in distinct frequency bands, and, as will be discussed later, most likely operating with differing protocol stacks of operation given the varying duplex separation of the uplink and downlink blocks.</p> <p>Indeed, if TATT were to more closely consider its own example for precedence for its decision, it would find that TSTT's exhortations have merit. It would be more appropriate for TATT to consider the duplex</p>	<p>developed for commercial LTE 700 in T&amp;T, proposed to be used by TATT's plan.</p> <p>TATT should not limit its considerations to specific technologies and carrier-grade technologies in particular. In so doing, TATT seems to be breaking its technology neutral rule, by being specific with respect to the technology it is planning for. This contradicts a primary tenet in TATT's Spectrum Management Policy.</p>	<p>Band 28. The Authority's allotment of spectrum in Band 28 is comparable to the US selection of 3GPP Band 14 for PPDR, within its 700 MHz band plan.</p> <p>Resolution 646 seeks to promote compatibility by designating only Bands 14 and 28 for PPDR in the 700 MHz band. This compatibility is evident in commercial LTE mobile handsets, where a single device can operate on both the US 700 MHz and APT 700 MHz band plans. It is expected that the same will be possible with PPDR devices, as LTE is the preferred technology for such use as well.</p>

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			<p>space to establish a specific band for PPDR, if such is deemed necessary.</p> <p><b>“The Authority has considered the possibility of using the duplex spacing gap, i.e., band 44, for PPDR...”</b></p> <p>TSTT believes that TATT has veered from one of its core principles here. TATT seems to be attempting to select the technology that should be deployed, as opposed to establishing a framework that will allow the operator to select the appropriate technology to meet its needs within the enabling environment. TSTT merely recommended an allocation that could support TDD deployment. TSTT did not recommend, in the last round, a TDD LTE deployment.</p>	<p>TATT should withdraw this response and be mindful of the constraints established by its Spectrum Management Policy, and fifteen (15) years of precedence with respect to the use of commercially defined spectrum for Closed User Group use.</p> <p>TSTT reiterates our belief that all of the available 90MHz (2 x 45MHz) of commercial LTE spectrum should be made available to PMTS concessionaires.</p>	<p>The Authority confirms that its reason for not viewing the duplex spacing gap in Band 28 (which is denoted as its own band, called Band 44), is not based on technology, since both bands employ LTE, but on the following:</p> <ol style="list-style-type: none"> <li>i. As per the first objective of Resolution 646, the identification of 3GPP Bands 14 and 28 for PPDR enables harmonisation, so that equipment may be used across borders, particularly to support disaster relief efforts. Therefore, an allotment to PPDR should conform to either Band 14 or 28, to maintain harmonisation within the region. The use of Band 44 will not be harmonised with other PPDR systems deployed in accordance with the APT band plan.</li> </ol>

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			<p>TSTT recommends that there should be continued consideration of the FDD LTE duplex spacing as the appropriate focus of allocation for a PPDR broadband system, be it TDD or FDD based with a paired block between 803 – 806MHz. In either instance, TSTT believes that non-operator-centric or bespoke networks should be considered.</p> <p>In either instance, TSTT reiterates our belief that all of the available 90MHz (2 x 45MHz) of the commercial LTE spectrum should be made available to PMTS concessionaires.</p> <p><b>“The licence granted to PPDR agencies will be akin to a closed user group telecommunications service, such as a trunked mobile spectrum licence.”</b></p>	<p>TATT should withdraw this response and be mindful of the constraints established by its Spectrum Management Policy,</p>	<p>ii. There is currently no ecosystem for handsets or network equipment for Band 44. However, the same handset and network ecosystem employed by commercial operators in the 700 MHz band can also be used by the Ministry of National Security for the deployment of a PPDR network.</p> <p>iii. Frequency division duplexing (FDD) LTE and time division duplexing (TDD) LTE are two different modes of operation of the LTE technology.</p> <p>The Authority is not promoting the use of one technology over the other. The Authority remains committed to its technology-neutral approach.</p> <p>The Authority respectfully disagrees and informs TSTT that the benefits of allocating spectrum to PPDR outweigh the benefits of fees generated from the economic value of the spectrum.</p>

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			<p>TATT's position stated here is divergent from its practice thus far over the last fifteen (15) years.</p> <p>TSTT is strained to identify a scenario where commercially allocated spectrum for fixed, mobile or broadcasting use, is issued for use other than public fixed, mobile or broadcasting, and even more troublingly assigned to a Closed User Group (CUG).</p> <p>Indeed, as an example, TSTT recalls that the TTPBA has in the past been vociferous in past consultations on whether they could use spectrum allocated and assigned for broadcasting for the provision of wireless broadband services. TATT has consistently rejected those proposals based on the principle that spectrum should be used for the function</p>	<p>and fifteen (15) years of precedence with respect to the discriminatory levying of fees for commercially defined spectrum used for Closed User Group as opposed to public telecommunications use.</p> <p>TATT to advise if this reversal is only in respect to 700MHz for PPDR? Or is this reversal applicable in all other bands? TATT should clarify why there is this marked shift in policy.</p> <p>TATT to reconsider its stated position.</p>	<p>The Authority also wishes to advise that the spectrum allocated to PPDR is in keeping with Resolution 646, which encouraged administrations to consider parts of the frequency range 694 – 894 MHz for PPDR applications, in order to achieve harmonisation.</p> <p>The Authority assures TSTT that the policy approach employed remains consistent with section 18(1)(g) of the Act, “to ensure compliance with the [ITU] convention”.</p>

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			<p>allocated. Here TATT reverses that position.</p> <p><b>“PPDR in 698 – 806 MHz will be used for closed user group telecommunications services and not PMTS. Hence, the licence fees will be different, as the types of licences issued differ.”</b></p> <p>TATT's position stated here is divergent from its practice thus far over the last fifteen (15) years.</p> <p>TSTT is strained to identify a scenario where commercially assigned spectrum for fixed, mobile or broadcasting use, is issued for use other than fixed, mobile or broadcasting.</p> <p>TSTT is similarly strained in identifying where fees for spectrum allocated commercially was not applied for that</p>		<p>Whilst the Authority recognises that the identification of spectrum within the 700 MHz band would normally be for commercial use, its approach is consistent with Resolution 646 (spectrum for broadband PPDR), which is in itself a new approach. The 700 MHz band is grade 1 spectrum and the economic value would normally be obtained for the use of such spectrum. However, its use for national security is non-commercial, for which the societal benefits outweigh the financial gains that can be attained from commercial use of the spectrum. Consequently, the licence fee associated with this band will be comparable to a similarly situated type of closed user group network, which is a trunked land mobile network.</p>

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			<p>commercial spectrum by virtue of a use which diverged from that public commercial allocation.</p> <p>TATT should proceed with caution, as actions in accordance with this divergent philosophy would be in contradiction to TATT's published policies and may open TATT's decision in this regard to be challenged.</p>		
3		Trinidad and Tobago Footnotes (TT53)  DORs response	TSTT	<p>TATT's response in this regard is noted.</p> <p>Mindful of the adage with respect to only what is measured can be managed, TATT should reflect on whether the appropriate strategy would be to facilitate unmonitored entry into the market of these units.</p>	<p>The Authority notes TSTT's concerns over TT53 which speaks to the class licensing of satellite phones in the frequency range 1616 – 1626.5 MHz.</p> <p>The Authority agrees that it should keep records of satellite phone users and establish the registration of these class-licensed devices, in accordance with the registration of devices process in the Authority's <i>Class Licensing Regime</i>. This decision will be recorded in the <i>Schedule of Devices Eligible for Use under a Class Licence</i> on the Authority's website (<a href="http://www.tatt.org.tt">www.tatt.org.tt</a>).</p>

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				<p>Further, TATT should be mindful of precedent set with the administration of VSATs – similar in that they both facilitate satellite to terrestrial communication, but where one requires licensing and registration, and one where TATT proposes no registration – and thus no knowledge of units in the market – at all.</p>	
4	<p>The Authority's response dated August, 2019 from its Decisions on Recommendations Matrix from First Consultation Round in relation to Section 2.1, Trinidad and</p>	Digicel	<p>Digicel (Trinidad &amp; Tobago) Limited takes this opportunity to thank the Authority for its feedback on our responses.</p> <p>As Authority indicated that it is awaiting WRC19 to decide upon a 5G spectrum plan, we ask that the Authority kindly provide a</p>		<p>The Authority thanks Digicel for its participation in the consultation process and its comments and recommendations made herein.</p> <p>World Radio Conferences (WRCs) are intended to revise the ITU Radio Regulations, the international treaty governing the use of the radio-frequency spectrum. Following the revision of the</p>

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	Tobago Allocations, Frequency Range: GHz, 25.5-27 GHz, 27-27.5 GHz, 27.5-28.5GHz, TT47 Footnote		timeframe by which providers can expect this proposal.		Radio Regulations by the ITU, the TTFAT and other relevant spectrum plans will be revised within the 2020 – 2022 period.
5	The Authority's response dated August, 2019 from its Decisions on Recommendation Matrix from First Consultation Round in relation to Section 2.1, Trinidad and Tobago Allocations, Frequency Range: MHz, 614-898 MHz	Digicel	With respect to the completion of the analogue to digital switchover for FTA TV broadcast, we ask that the Authority kindly provide the timeframe for the completion of such switchover as well as the subsequent re-allocation on the TTFAT.		<p>The Authority intends to complete the full implementation of the analogue-to-digital free-to-air television switchover by 2023.</p> <p>The process is still ongoing, with the finalisation of a DTT standard, the approach to implementation via a signal distributor, and a consumer awareness programme which is expected to commence in 2020.</p>