Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
	)	
Comments on spectrum policy	)	
recommendations of the FCC's Technological	)	DA 17-1165
Advisory Council (TAC)	)	
	)	
	)	
	)	

COMMENTS OF THE
NATIONAL SPECTRUM MANAGEMENT ASSOCIATION

The National Spectrum Management Association ("NSMA")[1] submits these comments regarding the spectrum policy recommendations of the FCC's Technological Advisory Council (TAC).

A. INTRODUCTION

The FCC's Technological Advisory Council (TAC) has offered three new ideas:

1. Principles for assessing compatibility of new spectrum allocations as described in the white paper "Basic Principles for Assessing Compatibility of New Spectrum Allocations."

2. Risk-informed interference assessment as described in the white paper "A Quick Introduction to Risk-Informed Interference Assessment."

3. Steps for improving interference resolution described in the white paper "Next Generation Architecture for Interference Resolution."

[1] The NSMA is a voluntary association of individuals involved in the spectrum management profession including service providers, manufacturers, frequency coordinators, engineers and consultants. NSMA's goal is to promote rational spectrum policy through consensus views formulated by representatives of diverse segments of the wireless industry.

The Commission invites comments on these spectrum management principles recommended by the TAC. They solicit views as to whether and how these principles may be integrated into FCC spectrum policy.

NSMA offers the following comments based upon the context of incumbent licensed fixed services and space services.

B. Basic Principles of Assessing Compatibility of New Spectrum Allocations

The TAC subdivides the principles into three major categories:

Interference Realities

Principle #1 -- Harmful interference is affected by the characteristics of both a transmitting service and a nearby receiving service in frequency, space or time.

Principle #2 – All [radio] services should plan for non-harmful interference from signals that are nearby in frequency, space or time, both now and for any changes that occur in the future.

Principle #3 – Even under ideal conditions, the electromagnetic environment is unpredictable. Operators should expect and plan for occasional service degradation or interruption. The Commission should not base its rules on exceptional events.

Responsibilities of [Radio] Services

Principle #4 – Receivers are responsible for mitigating interference outside their assigned channels.

Principle #5 – Systems are expected to use techniques at all layers of the stack to mitigate degradation from interference.

Principle #6 – Transmitters are responsible for minimizing the amount of their transmitted energy that appears outside their assigned frequencies and licensed areas.

Regulatory Requirements and Actions

Principle #7 – Services under FCC jurisdiction are expected to disclose the relevant standards, guidelines and operating characteristics of their systems to the Commission if they expect protection from harmful interference.

Principle #8 – The Commission may apply Interference Limits to quantify rights of protection from harmful interference.

Principle #9 – A quantitative analysis of interactions between services shall be required before the Commission can make decisions regarding levels of protection.

C. Basic Principles of Risk-Informed Interference Assessment

Risk analysis considers the likelihood-consequence combinations for multiple hazard scenarios, and complements a "worst case" analysis that considers the single scenario with the most severe consequence, regardless of its likelihood. Risk-informed interference assessment is the systematic, quantitative analysis of interference hazards caused by the interaction between radio systems. Such an assessment has three major steps:

1. Make an inventory of all significant harmful interference hazard modes.

2. Define a consequence metric to characterize the severity of hazards.

3. Assess the likelihood and consequence of each hazard mode.

D. Basic Principles of Developing the Next Generation Systems Architecture for Radio Spectrum Interference Resolution

The referenced TAC white paper outlines the tasks and key activities necessary to develop the architecture. Period of Performance, Deliverables and Cost and Resources are To Be Determined. Identification of responsible parties and specification of success criteria are not addressed.

E. Comments Regarding Basic Principles of Assessing Compatibility of New Spectrum Allocations

Principles 1, 2 and 4: Further investigations are needed before broad statements of "receiver responsibilities" are to be considered as generally applicable to all classes of receiving devices. The TAC white paper "Basic Principles for Assessing Compatibility of New Spectrum Allocations" does point out that "one policy fits all" is not possible with such disparate requirements of various services. We agree that services vary widely and one policy is not possible or perhaps one set of guiding principles must include consideration of the widely varying services to be useful. Industry consensus should be achieved in this area. NSMA has led this effort in the licensed fixed service bands and other industry groups have dealt with this issue within their areas of interest.

Principle 3: While a reading of the text associated with this principle acknowledges the need for services to design to avoid exceptional unfavorable events, the principle as stated could be misinterpreted. All fixed services which adhere to national or international standards must engineer to Long Term and Short Term interference standards as defined by the International Telecommunication Union Radiocommunication Sector (ITU-R). The Short Term standards are specifically defined to address relatively rare "unfavorable events". NSMA has defined recommendations to address this issue and these recommendations have been used successfully for decades. Acknowledgement of, and minimizing, exceptional "unfavorable events," is necessary for successful implementation of most fixed licensed radio networks which are designed for annual outages of only a few minutes a year..

Principles 5 and 9: Satellites are another medium that must rely heavily on the radio spectrum for command, control and communications. Optical communications notwithstanding, unencumbered radio links to and from space are essential to space systems. The space-based elements of a communications system are limited to solar powered sources and payload weight /

size restrictions- receiving systems on Earth must compensate for these limitations and for the path loss in the particular distance to a given vehicle.

Additionally, services where receive-only systems are not registered or documented in the regulatory system complicate the implementation of spectrum sharing. Regulators must better track and protect such receivers (e.g., C-band VSAT's, receivers of weather data, cable head ends, GPS applications) not associated with 2 Way communications where the receiver has no transmitter component. Basic principles must include such cases.

Principle 6: This is an established policy of the FCC with its spectrum mask requirements (§101.111). We support this principle.

Principle 7: We support this policy. NSMA guidelines (http://nsma.org/recommendations/) as well as TIA Bulletin 10F (https://global.ihs.com/doc_detail.cfm?document_name=TIA%20TSB-10&item_s_key=00032862&rid=TIA) have been developed to support this principle.

Principle 8: We believe the industry at large should be the final source of appropriate interference limits. That concept of using industry interference standards is currently supported in the FCC rules (§ 22.602(j), § 24.237(a), § 24 Appendix I To Subpart E, § 27.1134(b), § 101.3, § 101.79(a), § 101.105(a)(5), § 101.79(a), § 101.95(a), § 101.105(a)(5)(i) & ()ii, §101.105 (B) (7) (c)).

General Comments: Overall the white paper seems to imply that all services require the same level of protection. That is simply not true. In fact, not all services have the same concept of degradation. Public safety and critical infrastructure services demand a higher level of protection than do streaming movies. An understanding of these distinctions is necessary to effectively assess compatibility of new spectrum allocations.

The TAC's white paper statement: "If appropriate messaging can occur successfully then any interference to a signal cannot be deemed to be harmful" tacitly implies that all spectrum is used for the conveyance of messaging that originates at one or more transmitters and is communicated to one or more receivers. This fails to characterize the scientific use of the radio spectrum where active or passive remote sensing derive important information for which determining the impact of interference may not be readily discernible. Yet the consequences of altering the science can be substantial in fields such as weather forecasting. It may fail to appropriately weigh potential impacts to radio astronomy or techniques such as radio occultation or reflectometry.

This statement also fails to encompass the use where the message is not the service but rather the use of the message is. Simple retransmission will not provide adequate service when time delay is important. Services such as power grid transfer trip, SCADA monitoring of oil and gas pipelines, video and encrypted signal services come to mind as services which fail if the initial transmission is lost. Also, the consequences of initial loss of signal can be disproportionate to the length of radio system outage. Two second transmission system outages have caused 15-minute site reboots of cellular and LMR sites causing a significant loss of service from a seemingly inconsequential loss of transmission service.

Another important consideration in formulation of rules should be the coverage of existing receiving equipment within a service allocation. Receivers may have been designed to work over a range of intended or compatible services as represented by current allocations. Introducing a vastly different terrestrial service into a given band should not ignore the fact that a large number of receivers that would have functioned in the presence of existing services may fail to work in the presence of newly added shared services. Impacts to the heritage services in a

band segment may not be easily modified to mitigate the effects of adjacent band or in band interference from newly proposed or authorized services.

The TAC introduced the important concepts of Transparency and Reproducibility. We would like to reinterpret these a little differently than described in the paper but we acknowledge their importance. Regarding Reproducibility, if a new service is to be introduced into an existing service area, that concept should be evaluated under controlled conditions. An industry agreed to test plan should be used and a final report made publicly available. This report, with fully defined constraints, would validate the Reproducibility of the concept. Regarding Transparency, as new services are introduced into existing spectrum, it is vitally important that incumbents be made aware of activities of the new users. Despite the best efforts of all parties to estimate the impact of new services, interference can occur. It is important that the activities of new users be apparent to existing users so unintended consequences can be evaluated and mitigated. After-implementation transparency between existing and new users – and their coordination organizations - is critical. This transparency should be accomplished through easily accessible information transfers and avoid implementing legal and procedural roadblocks to sharing data.

The white paper overlooked the importance of antenna standards (of primary significance for many paths), site placement and shielding, sector avoidance for wide area transmission, efficient frequency plans based upon expected service, requirements for minimum spectral efficiency and availability as well as interference coordination among licensed users based upon accepted industry standards. This has been the basis of successful operation of fixed services for over thirty years.

F. Comments Regarding Basic Principles of Risk-Informed Interference Assessment

We disagree in principle with this approach to interference assessment. The quantification of "likelihood and consequence of each hazard mode" is highly subjective and will vary widely among evaluators. Our experience is *a priori* estimates of probable outcomes are seldom accurate. Experience defines reality and it is an iterative process. We believe that the users of the spectrum should be the final arbiters of interference assessment. Industry organizations are best equipped to deal with this level of ambiguity and complexity. For fixed service users, an interference coordination function seems mandatory. The white paper is not well supported by industry policy and procedures.

G. Comments Regarding Developing the Next Generation Systems Architecture for Radio Spectrum Interference Resolution

The referenced white paper is clearly preliminary. Responsible parties and success criteria are not defined. There appear to be no actionable tasks for the industry at this stage of development.

CONCLUSION

Overall NSMA supports efforts by the FCC to increase spectrum efficiency. As broad new portions of the electromagnetic spectrum are exposed to new services and density of terrestrial or aeronautical mobile use is increased, broad principals such as those developed by TAC are needed. Emerging technologies, such as commercial UAS / UAV or autonomous vehicles are limited to use of spectrum for connectivity. General policies for spectrum sharing and accommodation of interference must include such growth areas where wireless operation is an essential and unreplaceable requirement for their control and operation. Spectrum sharing and protection can be particularly complex when applied to vastly different disparate services, especially those involving public safety, critical infrastructure, space and acquisition of scientific data.

TAC's concepts of Transparency and Reproducibility are critical to the successful introduction of new services while protecting the incumbent systems. They deserve further discussion.

The TAC liked to use the analogy of property rights and easements. We like that approach and would like to extend it to include the role of Home Owners Associations (HOAs). Home owners have an interest in the maintenance of their neighborhoods. At a higher level, cities have zoning standards used to maintain areas for compatible use. Those concepts also apply to spectrum. The basis of HOAs and zoning standards is community involvement in the maintenance of areas of mutual interest. Industry organizations like NSMA provide the mechanism for creating appropriate user-based consensus interference standards. NSMA looks forward to working with the FCC and other stakeholders to formulate the interference analysis requirements and refine the coordination procedures necessary to maintain the licensed spectrum neighborhood.

Respectfully submitted,

George Kizer, President,
NATIONAL SPECTRUM MANAGEMENT ASSOCIATION
P.O. Box 528
Englewood, NJ 07631
972.333.0712

January 30th, 2018