A recent blog post from the Vice President of technical standards at Qualcomm complained that the 3GPP standards process was being manipulated by other participating companies exploiting an overly simplistic contribution count system.

https://www.qualcomm.com/news/onq/2017/08/02/top-5-drawbacks-contribution-counting-3gpp-dont-count-it

Some might say this is an example of the pot calling the kettle black but the blog makes useful points about the need to improve the present standards process.

In this month's technology topic, we explore the inherent disconnects between standards making, spectrum allocation, auction policy and competition policy and suggest that an adversarial approach to the repurposing of spectrum and related changes to spectral access rights is not a good basis for standards integration.

But finding a better approach is not easy.

Read on

For vendors, the incentive for participating in standards groups is that 3GPP members can seek intellectual property rights in accordance with the IPR policies of the regional standards setting authorities, the European Telecommunication Standards Institute (ETSI), the Association of Radio Industries and Businesses (ARIB) in Japan, the Alliance for Telecommunication Solutions (ATIS) in the US, the China Communications Standards Association (CCIS), the Telecommunications Standards Development Society (TSDI) in India, the Telecommunications Technology Association (TTA) in Korea and Telecommunications Technology Committee (TTC) in Japan.

While this is understandable, it has to be remembered that the purpose of a standard is to realize market efficiency by facilitating interoperability and market scale. In communication systems, interoperability and market scale are dependent on spectral harmonisation.

The harmonisation process and the standardization process have to be consensus based but in practice are influenced by special interests.

These special interests can be region or country specific and the differences can be subtle but significant, wider pass bands or different OOB requirements for example mean that either scale benefits have to be sacrificed or RF hardware has to be characterized for the worst case conditions, in this example the highest protection ratios. This will have an impact on device and network cost and performance.

The present structure used for 4G and 5G standards dates back to 1998 with the formation of 3GPP, partly driven by the recognition that US and rest of the world cellular standards needed to be brought together. Release 99 was the first standard issued by 3GPP with the intention that future Release dates would happen more or less yearly. Given that we are now on Release 15 this has not quite happened but the principle still applies.

Release 15 is the first Release to specifically address 5G physical layer standards and upper stack optimisation.

20 years of 3GPP standards have had to couple into 150 years of spectrum policy making under the auspices of the ITU. The ITU divides the world into three regions, Region 1 Europe and Africa, Region 2 America and Latin America and Region 3, the Asia Pacific and Australia.

Historically this has encouraged regional specific standards to be deployed into region or country specific spectrum, the Personal Digital Cellular Standard in Japan at 1.5 GHz and IS95 CDMA and IS54 and IS136 TDMA in the US 800 MHz band were two examples.

Legacy allocation decisions taken on a regional basis, for example the allocation of an ISM band between 902 and 928 MHz in the US continues to influence band plans and explains why the US does not have any 900 MHz cellular networks. An apparently minor regulatory decision can have a major long term impact. A cellular band at 800 MHz in the US means that the whole sub 1 GHz band plan is different to the rest of the world.

However spectral access rights are ultimately a sovereign responsibility. Every nation has a right to the final say on how spectrum will be used within its borders provided that coexistence with other geographically adjacent countries meets internationally agreed criteria.

In practice scale economies dictate that counties chose to harmonise their spectrum band plans regionally and when possible globally.

There are however also operator specific requirements. These have become increasingly complex due to the perceived need to support channel aggregation.

Dish Networks Band 70 is an example from the US, a concatenation of their AWS 4 spectrum (2000MHz to 2020 MHz), their H Block PCS spectrum (1995-2000 MHz) and unpaired AWS-3 spectrum (1695-1710 MHz). Sprint are another US operator specific example with their 'Gigabit LTE' tri band proposal combining their 800 MHz, 1900 MHz and 2.5 GHz band allocations.

3GPP address these regional, country and operator specific requirements by producing technical specifications - a specification, as the word implies, is specific to a particular requirement.

In 5G an additional level of complexity is introduced by the need to accommodate vertical markets. This is broadly covered by developing work streams for different requirements, for example enhanced mobile broadband (eMBB), massive machine type communications (mMTC) and ultra-reliable low latency communication (URLLC).

In practice, particular industries are going to have particular requirements that will need to be met. 3GPP has to work with parallel standards making organisations including IEEE and higher layer protocol standards bodies such as the IETF developing vertical market specific profiles and with the vertical market standards bodies. Utilities for example have different standards in different countries, even countries within the EU can have marked differences in the way that electricity, water and gas are managed, monitored, measured and regulated.

The ongoing work to develop a 5G automotive industry offer is another example. Automotive industry standards are at least as complex as telecommunication standards and have multiple touch points with IEEE standards making including 802.15.4 and 802.11 based connectivity. Specifically, work outputs from 5GAA (the 5G automotive association) will need to be closely coupled with IEEE 802.11p standards and spectrum band plans.

This is made harder by the move within 3GPP to introduce licensed spectrum standards into unlicensed spectrum (LTE-U and LTA Licensed Assisted Access). Coexistence issues whether

real or imagined are not a good basis for constructive standards engagement. Aspects of this were covered in last month's discussion about LTE and Bluetooth Low Energy (BLE).

However there will also be a need to integrate 5G vertical market work items with vertical market work outputs from other parts of the telecommunications supply chain including the satellite industry. The announcement that the Non Stand Alone (NSA) implementation of the 5G 'new radio' (NR) physical layer will be complete by the end of this year with large scale trials and deployments in 2019 suggests an ambition that will not be welcomed by the existing satellite operator incumbents in the target bands (3.5 GHz, 4.5 GHz, 28 GHz and 39 GHz).

This brings us to the thorny question of competition policy.

The purpose of competition policy or the related discipline of antitrust policy is to counter monopolistic behaviour and to ensure efficient markets.

Antitrust legal cases can take years to resolve. Intel is still fighting a $1billion dollar fine imposed seven years ago by the European Commission for alleged anti-competitive behaviour against AMD. Qualcomm has been facing resistance from the European Commission to their proposed takeover of NXP.

The mobile operators are additionally constrained by auction policies which are country specific but which have generally followed the principle that five operators per market produce the most market effective though not necessarily most cost effective outcome. In practice deploying multiple parallel networks can be ludicrously wasteful and particularly expensive for market entrants who do not have existing fibre and site assets.

The standard process in its own right could be considered anti-competitive because it makes market entry disproportionately expensive, a lesson that Intel and Broadcom learnt with LTE.

However it is easy to identify weakness in existing practices and processes but hard to suggest better alternatives.

To quote Mr Churchill, '*Democracy is the worst form of government except for all the others'* and it may be that our existing standards and spectrum policy making procedures are as good as they are going to get.

Ends

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5G and Satellite Workshop- Sydney and Singapore

We are delighted to be working again with Niche Markets Asia presenting a 5G and satellite and local area connectivity workshop in Sydney on Monday and Tuesday 30 and 31 October. We will also be speaking at **Radcomms 2017**, the leading spectrum management conference organised by the Australian Communications and Media Authority (ACMA) on Tuesday and Wednesday 1 and 2 November and then running the two day workshop in Singapore on Monday and Tuesday 6 and 7 November.

More details here

5G BOOK – 5G Spectrum and Standards – Geoff Varrall
Published by Artech House

The spectrum, band plan and standards choices for 5G and satellite mobile and fixed broadband,

the technology and the economic impact of these choices on the mobile broadband and satellite industry supply chain, operator community and target vertical markets.

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The technology economics of wireless versus fibre, cable, copper and satellite connectivity and the changing business dynamics of the telecommunications industry.

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RTT, The Mobile World and Policy Tracker are working on a new book project on 5G and Satellite Spectrum and Standards and related regulatory and competition policy issues prior to WRC 2019. The book will be published by Artech House next year.

If you are interested in knowing more about this project or are developing products and services that you feel should be included or a regulatory and advocacy position that you feel should be reflected then please e-mail us for more information.

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