



## Sic Transit

Do you remember what this Latin phrase means? The full phrase is about the demise of the glory of the “world” and it stems from the 14<sup>th</sup> century when people were concerned as much, if not more, with the heavenly hereafter as with the profane here-and-now. These days we still look forward to a future when we will be released from the restrictions of today and everything will be faster, smarter, better. Techno pundits are main the prophets of this belief and their followers include techies as well as journalists, business leaders as well as policy makers. Popular articles of faith include TV White Space, Cognitive Radio, most recently, Radio Virtual Machine. A common element in this list is not only the disregard toward feasibility but also the absence of any reference to practical matters like cost of implementation or return on investment – matters that determine whether a technology will be taken up by the market.

TV White Space (spectrum), also known by its more esoteric label of “digital dividend”, was heralded as the great opportunity for all and sundry to offer new services, to bridge the digital divide and to make the world more secure, thanks to low cost, long range wireless broadband facilities. We all know what happened: the best part spectrum freed up by the digitalization of broadcast TV was gobbled up by the cellular industry and the spectrum left for “private” use was burdened by the obligation to defer to TV broadcast transmissions. To make sure that such deferring would happen correctly a spectrum data base is needed where licensed priority users advertise their actual use and ad-hoc users can find out what spectrum is free in which location. Great technology but rather useless once you recognize that the number of free TV channels in inversely proportional to population density. That, together with the uncertainty about service delivery inherent in shared spectrum usage, killed the business case.

Cognitive Radio (CR) was another technological credo that promised the release from the limitations of traditional spectrum management – too slow, too restrictive, etc. The military stood to gain from this great new stuff: radios that know about their environment and adjust and optimize their spectrum use accordingly. Similar benefits would accrue to civilian users. The first public signs that CR was more promise than reality came with the de facto demise of the DARPA XG project. Another sign is that the name changes to “Software Defined Radio” – a far less ambitious phrase. In the CR case, a sense of reality set in once it was clear that the combination of uncertainties about policies and actual spectrum conditions presents a huge hurdle, regardless amount of money or clever engineering thrown at it. Here too, uncertainty about service delivery inherent in shared spectrum usage, is the killer.

Radio Virtual Machine (RVM) is the next incarnation of the CR hype. According to the estimates of the Wireless World Research Forum, *“by 2017 there will be 7 trillion wireless devices serving 7 billion users. To meet these expectations with the limited radio spectrum, more flexible ways to share radio networks and frequencies amongst multiple services and radio networks are needed – and [RVM] technologies offer the solution”*. Note the numbers – a 1,000 devices per

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person! – and the indefinite phrasing. The promise is great, the delivery on that promise will follow its predecessor.

The undercurrent in the above is fear – or at least a sense of uncertainty – about the future of wireless communications. Initially, spectrum shortage was used as an argument to justify changes in spectrum management – away from the government, into that hands of “the market”. The CR/SDR/RVM people have used it to justify their dreams. More down to earth – well aware of feasibility and return on investment issues – is the cellular industry which harvested lots of spectrum.

In the meantime, the Internet of Things, enabled by digital technology and driven by the big data movement, is gaining traction. Wireless IoT needs spectrum and absent adequate spectrum resources, IoT developers will have to turn to the cellular industry. More about that another time.

Do you have comments or suggestions? I appreciate your feedback!

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### Also read the paper:

#### [Sharing License-Exempt Spectrum based on Multidimensional Metrics](#)

This paper proposes a new approach to radio regulations for license exempt spectrum – spectrum that is essential as basis for the growth of the Internet of Things, Machine to Machine communication.

The current regulations for license exempt spectrum consist of a mixture of detailed rules with a largely historical background. The inconsistencies and restrictions characteristic of these rules prevent innovation as well as efficient use of the available spectrum.

The new approach offered by this paper is based on the insight that efficient and innovative use of spectrum is best served by simple, technology independent rules that control the interference potential and reward interference resistance in wireless equipment. Such rules give designers the freedom to develop optimal products and to compete effectively in world markets.

This paper was published in the INFO magazine of April 2016. The lead author is Jan Kruys who is responsible for regulatory affairs at GreenPeak Technologies.

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