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LTE & WiMAX Blog

Broadband is re-defining the way technology is being deployed and who is playing a major role. The operators of the yore like – AT&T, Verizon are slowly giving way to spectrum holding partnerships like – Clearwire, Harbinger, etc. Cellular services are getting commoditized and networks of the future will become dumb pipes, through which services instead of just voice and data will be optimally delivered based on tiered pricing and Quality of service. Pay per minute and pay per megabyte will become a delivery mechanism for many operators, as user habits keep changing. Subscribers have become content generators from content consumers with social networking and micro blogging; and with smart phones making a plethora of applications that make use of data pipes similar to PCs, the trend will only keep increasing.

The recent Harbinger deal with NSN to build out a $7 Billion dollar LTE network from an investment house has changed the rules? Is this a newcomer's business plan a smart strategy or just another pipe dream? Will Harbinger's LightSquared promise to build a nationwide LTE network covering 260 million people by year-end 2015 possible? There is a lot of controversy and skepticism in the market regarding that and a part of the reason may lie in the way LightSquared acquired its spectrum. After receiving a nod from the FCC to merge with mobile satellite firm SkyTerra in March, Harbinger revealed its plans to use a little-known FCC rule that allows mobile satellite spectrum holders to back up their satellite coverage with towers. The result is clearance to build a conventional ground-based terrestrial wireless network in conjunction with a satellite network. Under the current rules, all devices that LightSquared or its wholesale partners use will have to connect to the satellite network, which some believe will drive up the cost of devices and make it a niche.

This is the new paradigm of wireless, spectrum holders and Investment houses making foray into the Telecom wireless delivery with a network deployment and creating a network of networks. Some of the reasons for this shift in can be attributed to these -

Spectrum Holdings

Spectrum is a scarce resource and most operators have overpaid in the past, as well as overpay at every FCC auction. It has become the battlefield where deeper pockets have decided who wins and who gets relegated out of existence. Holdings of spectrum play a key role in developing an ecosystem of Infrastructure, network and devices around it. Clearwire is a very good example of how a spectrum holdings company formed from a partnership with Sprint, Intel and others and has launched WiMAX services in more than 50 markets across the US and is moving towards an LTE trial, due to its unique holdings of spectrum.
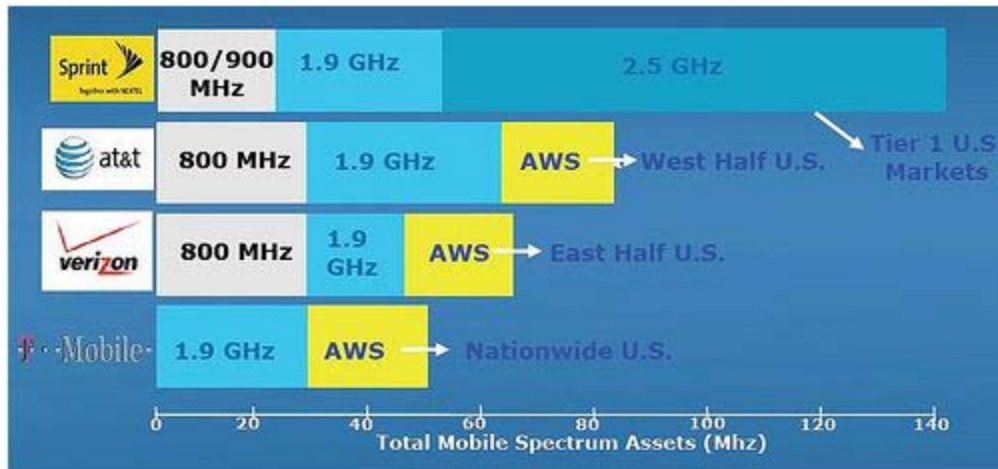
LightSquared has access to 59 MHz of spectrum at 1.6 GHz and at 1.4 GHz, and plans to deploy LTE with 5 MHz for the downlink and 5 MHz for the uplink. However, only 13 MHz of LightSquared's 59 MHz of spectrum is available for its terrestrial-only services. But the good part is the company's spectrum will support superior indoor penetration.

To complement the terrestrial LTE network, LightSquared will deploy two geostationary satellites that will provide backup coverage. LightSquared partners will want to use LightSquared's terrestrial network, but he expects the satellite component to appeal to three segments: public safety, machine-to-machine apps and services in rural areas. LightSquared's unique spectrum position and satellite requirements could make it difficult for the company to obtain suitable devices.
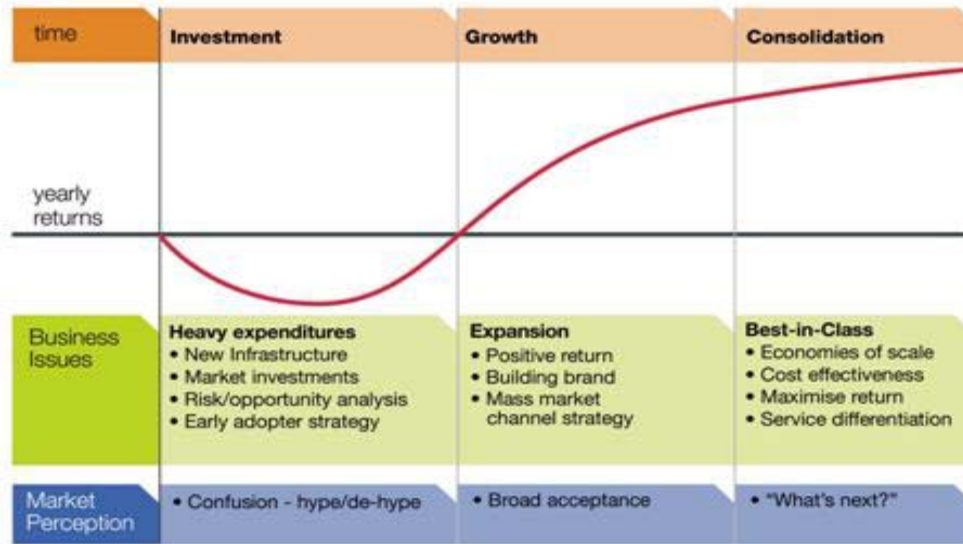
"If you build it they will come" – a strategy that is adopted by the new wave of operators like Clearwire and Harbinger and would be very interesting to watch as it plays out.

Technology cycles

Technology cycles in the past have lasted longer – 3G came after 10 years of having GSM, but 4G systems have come only after 7 years of 3G systems. Which means that the operators have to upgrade their systems to 4G to satisfy consumer behavior, and in the process having to spend CAPEX without actually realizing the costs from earlier investments? Technology cycles follow four common steps:

1. R&D creates a new technology
2. Industry challenges the concept
3. Early adopters explore the potential
4. Consumers and operators accept the technology and reap the benefits

New technology is rarely adopted smoothly and market acceptance always takes time. This is a typical aspect of any technology cycle. We can construct a three-phased cyclical framework to analyze technology trends. This approach is based on Kondratiev cycles of economic trends and can provide insight into the current debate surrounding technology deployment.
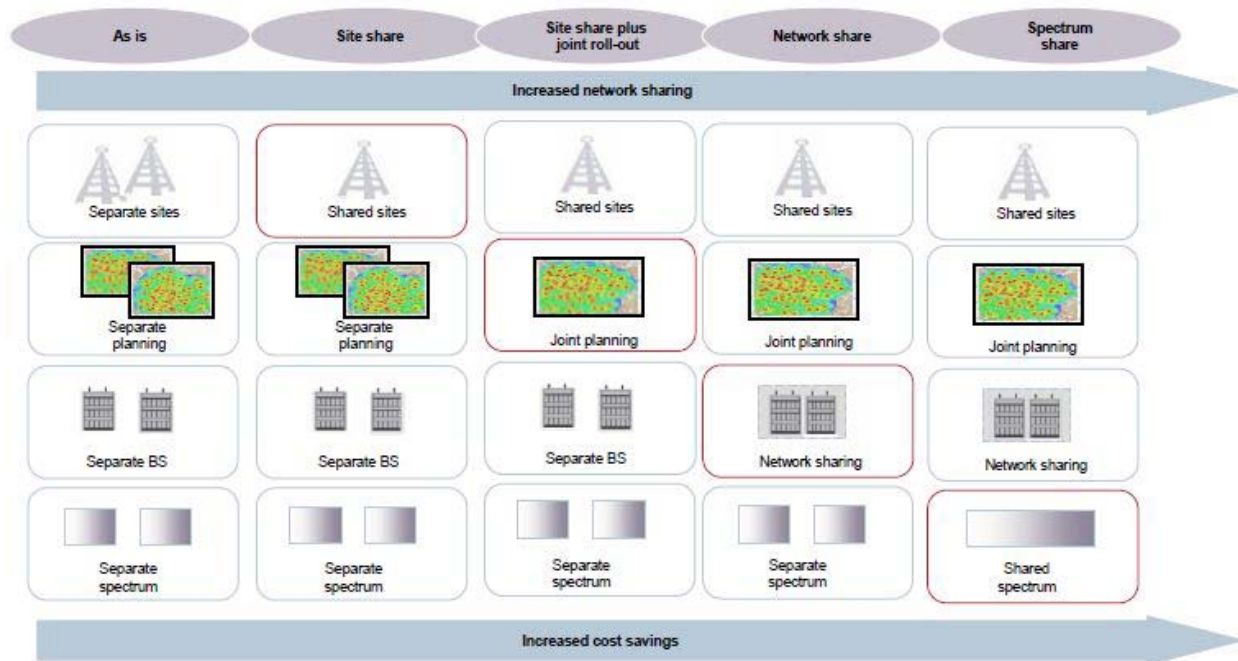
time	Investment	Growth	Consolidation
yearly returns			
Business Issues	**Heavy expenditures** • New Infrastructure • Market investments • Risk/opportunity analysis • Early adopter strategy	**Expansion** • Positive return • Building brand • Mass market channel strategy	**Best-in-Class** • Economies of scale • Cost effectiveness • Maximise return • Service differentiation
Market Perception	• Confusion - hype/de-hype	• Broad acceptance	• "What's next?"

Broadband technology deployment will define the way traditional Telcos do business in the changed environment, which will means RAN-sharing, cost sharing models will take precedence, due a shorter cycle for dollars invested (CAPEX) in Infrastructure. And the next wave will be connected devices and Machine-to-machine.

Interoperability & Network Sharing

4G networks are all-IP and are inter-operable with each other paving the way companies share RAN as well as core resources. A multi-RAN sharing agreement is now feasible and a future looking 3GPP LTE specs were developed as per NGMN usecases with inter-operability with WiMAX systems and other non-3GPP access technologies. The usage of Mobile IP (MIP) and Session Initiation Protocol (SIP) will allow Handover mechanisms between two separate RAN technologies with Home Agent (router used for authentication) and Foreign Agent (router in roaming network). There are different RAN sharing models that can be followed to accomplish this.

Network sharing brings in a lot of benefits both to the ecosystem – less customization for individual operators, plus a cost-benefit for most operators. RAN-sharing models have be in existence since a long-time with roaming and other benefits, but a model on which one Operator completely depends on delivery of another technology as an overlay is new with 4G. Sprint depending on Clearwire for its 4G needs is a new thing in the US, even though technically they are partners and Sprint is a stakeholder in Clearwire. And this will bring many operators like T-Mobile USA, MetroPCS, etc to jump the bandwagon and become MVNOs to either one of these network of networks.

As is	Site share	Site share plus joint roll-out	Network share	Spectrum share
Increased network sharing →				
Separate sites	Shared sites	Shared sites	Shared sites	Shared sites
Separate planning	Separate planning	Joint planning	Joint planning	Joint planning
Separate BS	Separate BS	Separate BS	Network sharing	Network sharing
Separate spectrum	Separate spectrum	Separate spectrum	Separate spectrum	Shared spectrum
Increased cost savings →				

WiMAX and LTE both have been designed in such a way that the concept of roaming and interoperability comes built in. Clearwire has taken a technology agnostic stand and has agreed to a trial for both FDD and TDD LTE on its network, which means that this network of networks will have both WiMAX and LTE networks in their network and provide broadband services to any customer – retail or corporate!

Survival of the fittest – Bundled services and Partnerships

Bundled services that have been offered by cable companies like Comcast etc have always been cash cows for cable operators. They are now making foray into wireless broadband offerings and TV streaming services like FIOS TV from Verizon, bundling all services together – VOIP, Data, TV and Home phone service. What might be missing are services like home security and Machine to machine like But in the end the customer will gain in terms of pricing as well as service offerings. Bundling products with other functional complementary products is a common and widespread practice. The best-known example is Microsoft Office, in which a word processor, a spreadsheet, a database and a presentation tool have been bundled. Companies use bundling to pursue price discrimination, increase sales, promote customer lock-in and create entry barriers. Although bundling strategies have been around for quite some time, little is as yet known about what constitutes a successful bundle. People may be more likely to purchase bundles composed of complements than

bundles of similar or unrelated products. In the case of service bundles in the navigation domain complementary add-ons that build on the initial core, like traffic information or parking assistance, may enhance the initial service value. Similarly, services that allow a customer to access and enjoy his purchased and protected content outside the home domain, for example on a friends audio system, enhance the core idea of device interoperability. We call this type of add-on service enhanced, i.e. enhanced services are directly related to the core service and enhance the core experience. Other complementary services may extend the initial (core) benefits in new directions, e.g. location-based advertising in combination with navigation services, or legitimate p2p content exchange with content consumption.

Comcast has a partnership with Clearwire and has been selling WiMAX dongles and getting bundled internet services available for many markets including - Internet+Cable+VOIP+wireless Internet. Partnerships in telecom have always been beneficial like Apple and AT&T, but they will become more so with 4G, which makes delivery of Value added services like MBMS(Multimedia Broadcast Multicast Service), VOIP, IMS and broadband easy along with device ecosystem like Iphone, Ipad and Kindle-like devices. This will be an interesting segment to watch in the next few years as the standards, networks and chipsets evolve.