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Advances in Wireless Technology and Impacts on Broadband Deployment

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Wireless can emerge as an efficient alternative to wireline broadband access

- Wireless technology in the US has evolved from voice centric technologies that have been retrofitted for data and are not competitive with Cable and Telco services
- The US has urban areas that require optimization for higher capacity and rural areas that require optimization for longer range, so technologies that are flexible in how they are configured are required so wireless can better serve these markets
- A new broadband data approach is required for wireless to truly emerge as an alternative to wireline access

Time Division Duplexing (TDD) technologies are better suited for delivering broadband access than FDD systems

- **Better for carrying data:** TDD's flexibility in assigning time slots for uplink and downlink operations allows greater flexibility over assignment of spectral resources than FDD making it ideal for asymmetric data transport as opposed to voice (which is inherently symmetric in use)
- **Better able to take advantage of adaptive antenna technology:** TDD's use of the same frequency for downlink and uplink allows for more precise beamforming thereby increasing the effectiveness of Spatial Division Multiple Access (SDMA) techniques that can provide added range and higher aggregate cell capacity
- **More cost efficient CPE:** TDD's analog electronics configuration is simpler (and cheaper) than FDD since the need for diplexing filters is eliminated
- **Spectrum flexibility:** TDD can be deployed on unpaired spectrum so the reallocation process can be simplified (from Federal users or underutilized commercial users) since there would be no need for a cumbersome process of matching and clearing paired spectrum blocks

TDD use has some spectrum policy implications

- **Restrictions on license block sizes:** Unless the government specifies technology and time slot allocations, TDD spectrum assignments essentially must be national or at least very large in scope, due to interference issues along the boundaries of license areas if synchronization is not performed

- **Co-existence with pre-existing FDD Allocations:** Interference planning where adjacent FDD blocks exists needs to take into account both mobile-mobile interference as well as base-base modalities, and be based on good technical analysis, such as the 700 MHz auction's technologically neutral rules and the recent OET analysis and conclusions in the AWS-3 proceeding

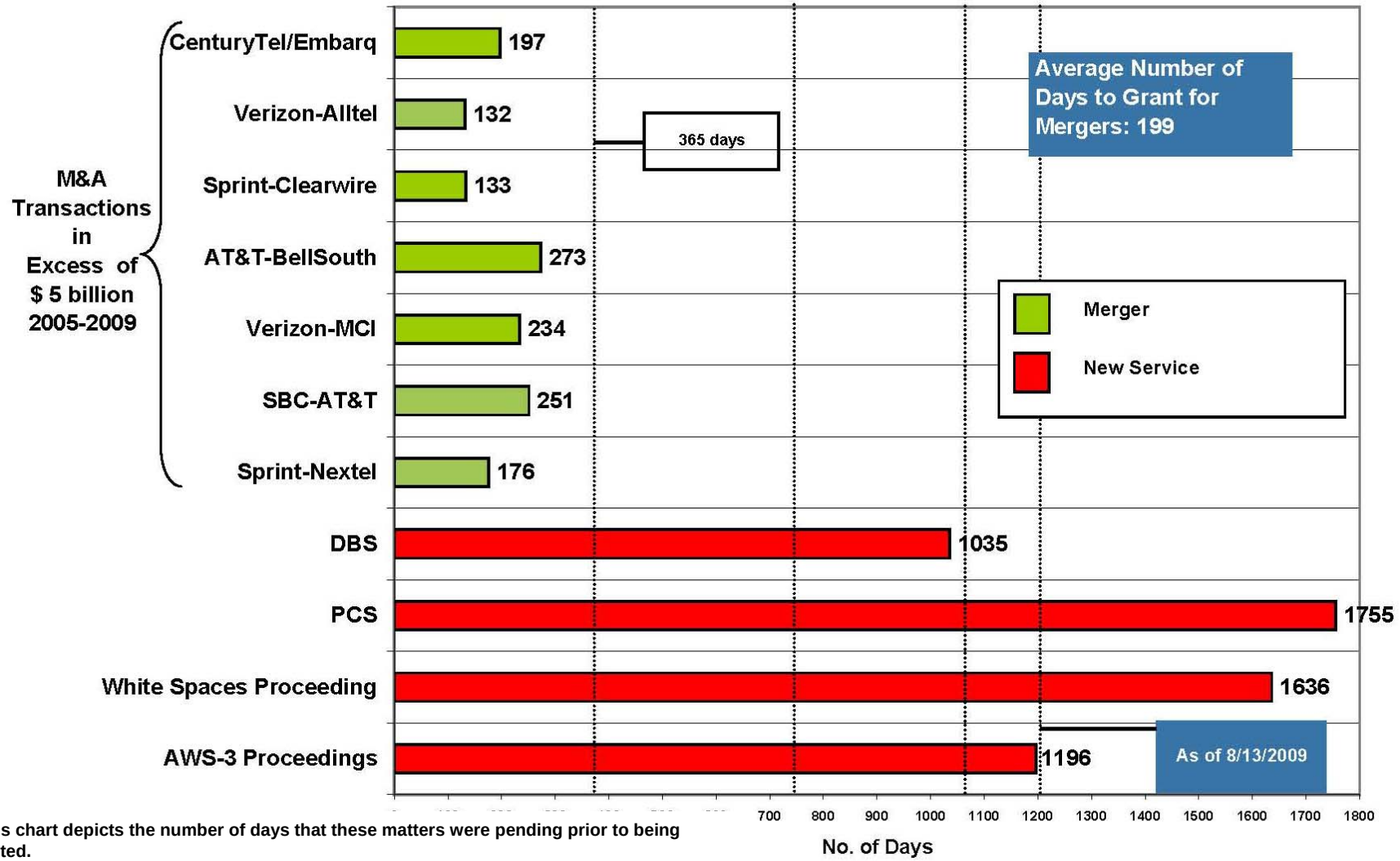
- **If the primary goal is using wireless technology to deliver broadband data, then explicit spectrum allocation for TDD use should be the answer**

Advances in the form of "Programmable" radios will enable new types of broadband service models

- **Multi-protocol radios:** New baseband technologies are coming that enable a single radio to communicate using multiple air link protocols – (e.g. LTE, Wi-Max, and Wi-Fi – all OFDM based systems)
- **Frequency flexibility:** New broadband RF stages from companies like Bitwave will enable handsets and other devices to communicate not just in a few bands, but over a wide swath of spectrum (e.g. 700 MHz to 3 GHz).
- **Handsets and devices that work on multiple kinds of networks:** With these new technologies, vendors can continue to sell devices that work on one or two primary networks, but also opportunistically use other networks based on speed requirements, location, or other service options, similar to the way current handsets use Wi-Fi today
- **Consumer Empowerment:** This change can upend the carrier centric model and move network choice further into the hands of the consumer

FCC processes should make it easier to deploy these broadband optimized wireless technologies

- **FCC priorities are often oriented around tasks like merger reviews and incremental tweaks to current regulations, whereas new service approvals take exorbitant amounts of time (see chart)**
- **If rapid exploitation of new technology and services for broadband deployment is the new priority, then FCC processes and priorities should reflect that principle:**
  - FCC proceedings on new services should move the burden of proof so it is on the opponents of new services and technologies that have to prove their case as opposed to proponents having to justify why it should be authorized
  - New service authorizations should take less time than merger and license transfer reviews and should be accorded a definitive timeline for a decision



*** This chart depicts the number of days that these matters were pending prior to being granted.**