UTILITIES TELECOM COUNCIL

Wireless Spectrum Research and Development (WSRD) Workshop IV

Brett Kilbourne

Cambridge, Massachusetts

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Main Points

- Utilities are interested in sharing spectrum with Federal government incumbents.
- UTC's proposal to share Federal spectrum, recognizes that:
  - Utilities and federal government can compatibly share spectrum
    - Smart grid applications are predominately fixed and operations could be configured to share during certain times of day or in certain areas.
    - Similar communications needs/missions; utilities represent a limited class of well-understood users.
  - Spectrum sharing represents a way for utilities to meet near-term needs.
- UTC supports sharing 3.5/3.65 GHz and 700 MHz/4.9 GHz bands.

Smart Grid Applications

Typical End-to-End Delay Requirements

Application	Delay Allowance (minimum) ms	Priority 0-max 100-min
Delay <= 10 ms		
(High speed) Protection Information*	8, 10	2
Load shedding for under frequency	10	20
10 ms < Delay <= 20 ms		
Breaker reclosures*	16	15
Lockout functions*	16	12
Many Transformer Protection and control applications*	16	12
System Protection (PMU)*	20	12
20 ms < Delay <= 100 ms		
SynchroPhasor Measurements (Class A)	60	10
SCADA data poll response	100	25
PTT signaling (critical)	100	30
PMU clock synchronization	100	20
100 ms < Delay <= 250 ms		
VoIP bearer (inc. PTT)	175	50
VoIP signaling (inc. PTT - normal)	200	60
Dynamic Line Rating (DLR)	200	40
Real-time video (mobile WF)	200	55
On demand CCTV video	200	55
Other SCADA operation	200	45
Enterprise data - preferred	250	70
Most distribution and SCADA apps	250	65
AMI - critical	250	60

** Traffic for these applications is only between two substations connected with transmission line. This traffic must be designed to be only single hop. Thus the corresponding delay requirements must be considered only single hop. All other delay requirements may have to be satisfied over multiple network hops.*

Extreme reliability and delay requirements that Broadband Wireless generally will not support for awhile

Applications that can be supported for the near term over an LTE Private Broadband Wireless Network

Smart Grid Applications
Typical End-to-End Delay Requirements

Capacity considerations may limit high rate video streaming (surveillance) to on-demand in portions of service territory

Application	Delay Allowance (minimum)	Priority
	ms	0-max 100-min
250 ms < Delay < 1 s		
AMI - priority	300	70
CCTV stream - normal	400	75
PMU (class C)	500	80
Some Transformer Protection and Control Applications	500	80
Enterprise data - other	500	80
1 s <= Delay		
Image files	1000	90
Fault recorders	1000	90
(Medium speed) monitoring and control information	1000	90
(Low speed) O and M information	1000	90
Fault isolation and Service restoration	1000	90
Distribution applications	1000	90
AMI periodic measurements	1000	85
Text strings	1000	90
Audio and video data streams	1000	78
Fault Recorders	1000	90
Best effort, Default	2000	100

Applications that can be reasonably supported over current carrier networks (leased capacity)