

KTS



Product Vision

SineComTM

Agility White Space Radio (AWR) Positioning in the White Space

Presented To: Tim Cross
Project Director - Ofcom
June 24th , 2014

KTS Wireless & Partner Overview

- Founded in 1982 and headquartered in Lake Mary, FL
- Nearly 30 years experience designing, developing and manufacturing wireless products and solutions
- Founders in numerous wireless product companies including MeshNetworks (sold to Motorola), Intelesys (sold to Comsat RSI) and Atlantic Communications Sciences (sold to PCOM).
- Excellent performance record on government programs
- KTS Wireless is standard products division of KTS

Partner Information:

- SineCom Limited, UK based wireless consultancy & product development
 - Over 30 years experience including management roles in NERA, P-COM and Centerpoint specializing in PTP & PTMP radio products.
 - Collaboration with KTS on RF architecture & product development for over 10 years
 - Product to market management for KTS Wireless into EMEA/Asia Pacific region



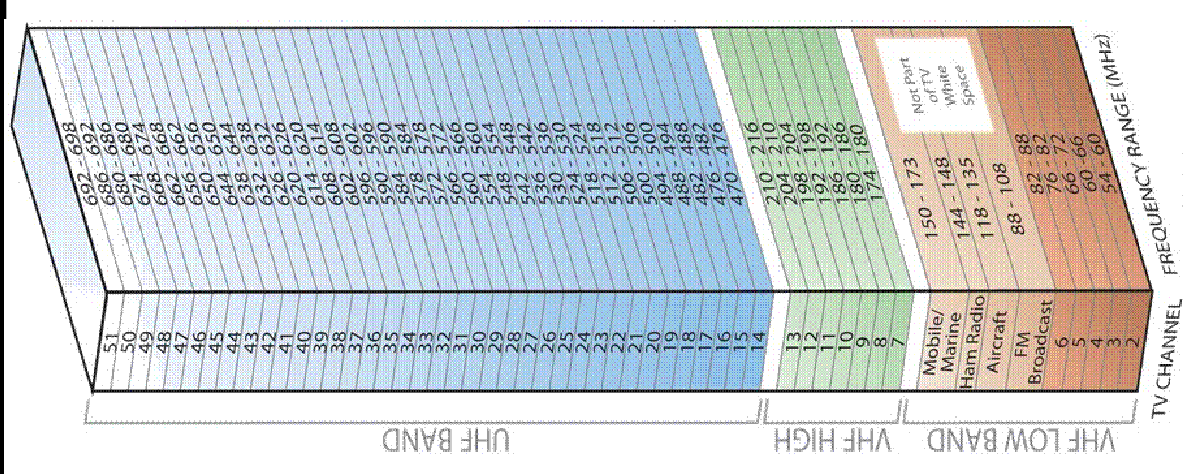
• Spectrum Bridge, leaders in shared spectrum solutions

- First Live TVWS Shared Spectrum Platform, certified by FCC
- First to Launch TV White Space Commercial Service in Wilmington, NC
- Involved in TV White Space initiatives Globally-UK, Finland & Singapore

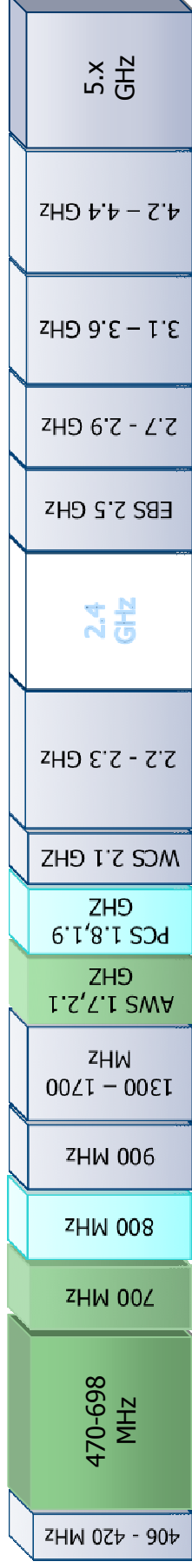


What is TV White Space?

- As a result of the Digital Transition from analog TV, additional spectrum became available for broadband applications.
- Traditional TV channels were from 2-69. Over time these channels have been compressed and some have been sold to cellular carriers for 4G solutions.
- The rules are quite complex, but at a high level this spectrum is available on an unlicensed basis to users for broadband applications similar to WiFi.
- TV White Space is attractive, due to it's much lower frequency compared to existing unlicensed spectrum.
- Lower frequencies propagate better over greater distances and through walls.



Compare/Contrast With Incumbent Technology



White Space Spectrum

Defines a technology that operates in the 470-698 MHz ISM band

Excellent NLOS propagation characteristics

>100 MHz spectrum available in rural areas

Range up to several miles

1 km obstructed area would require 1, perhaps 2 APs

Traditional Wi-Fi Spectrum

Defines a technology that operates in the 2.4 GHz ISM band

Despite 80 MHz spectrum available, often congested

Range <100 m

1 km obstructed area would require 25 APs

KTS Wireless White Space Strategy

- Telemetry Plus Market
- SCADA Migration: Narrowband to Broadband
- Modulation Focused on Robustness and Range (BPSK/QPSK)
- World's First FCC-certified White Space Radio

Broadband

- High Bandwidth
- Short Range
- LOS operation

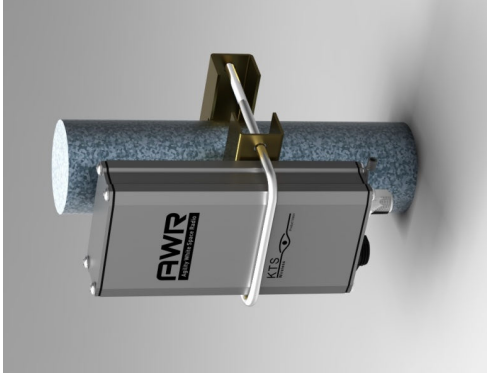
White Space (UHF)

- ✓ Extended Range
- ✓ NLOS Performance
- ✓ Video Bandwidth
- ✓ Unlicensed Spectrum

**White Space Technology Enables
Growth in SCADA+ Applications**

Narrow Band

- Low Bandwidth
- Long Range



Throughput

Range

Traditional SCADA Environments are Changing



Oil and Gas



Water/WW



Mining



**Energy/
Utilities**



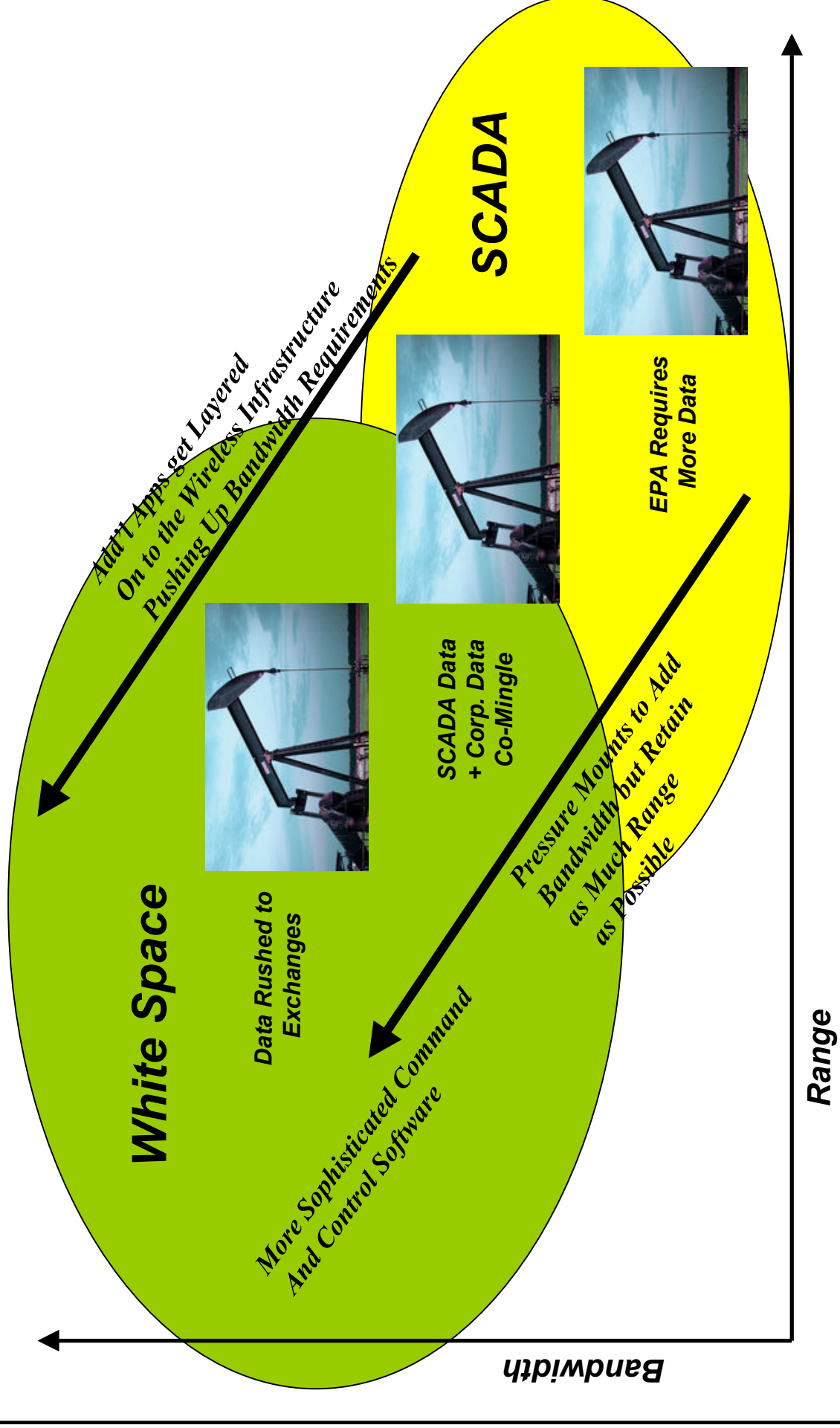
**Precision
Agriculture**



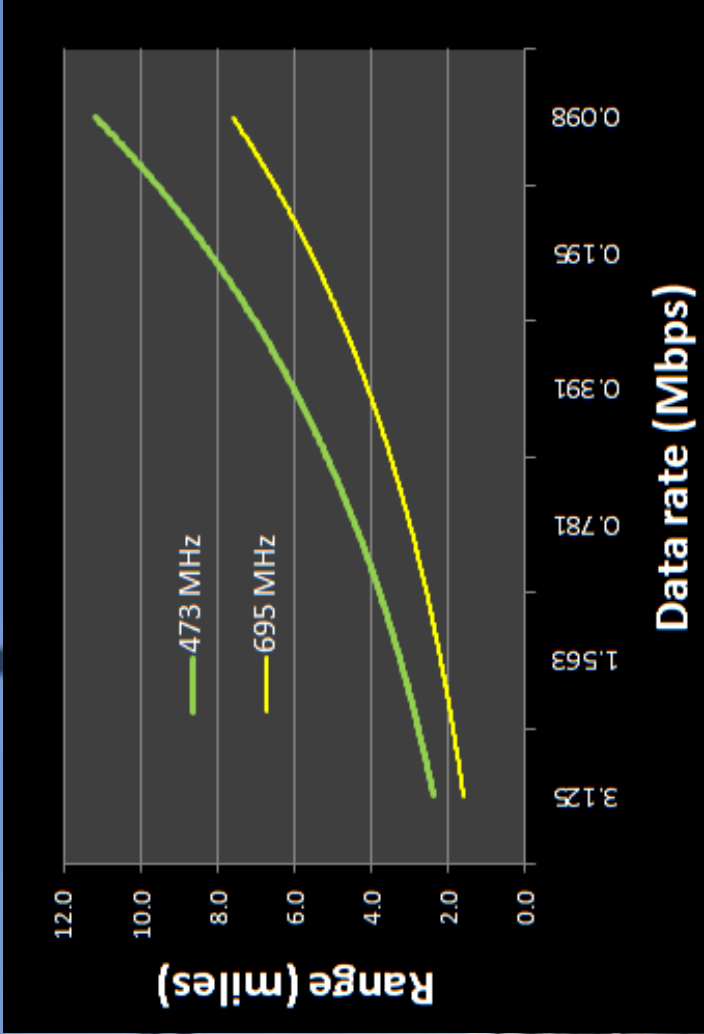
**Asset
Tracking**

***And Many More
Applications***

Factors Putting Pressure on Narrow Band



Performance Metrics and Data



Data Rate (Mbps)	1/2 Rate FEC	Sensitivity (dbm)	Range (Miles) at 473 MHz	Range (Miles) at 695 MHz
3.125	no	-90	2.2	1.5
1.563	yes	-95	3.5	2.4
0.781	yes	-98	4.6	3.1
0.391	yes	-101	6.1	4.2
0.195	yes	-104	8.1	5.5
0.098	yes	-107	10.8	7.3



Agility White Space Radio (AWR)

Access the Utility of UHF Spectrum



FCC Certified Solution for

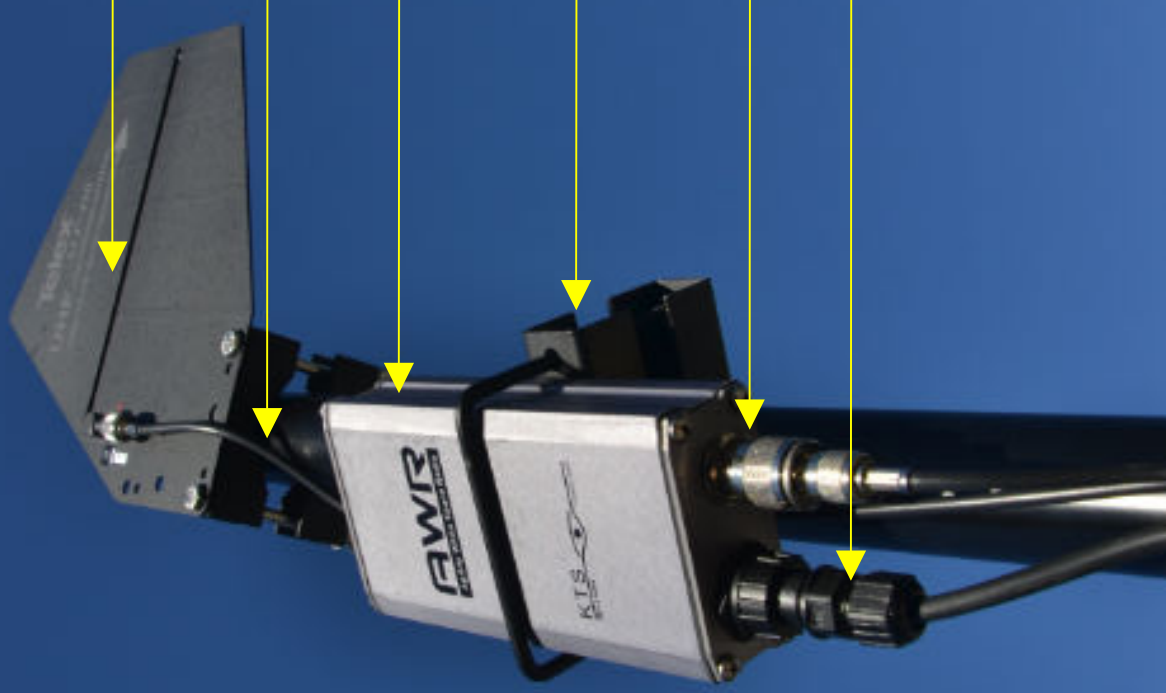
- Precision Agriculture
- Logistics/Asset Tracking
- Oil & Gas
- Utilities: Water/Energy
- Perimeter Defense/Security
- Intelligent Transportation

- ✓ Broadband to SCADA+ data rates
- ✓ Compact and surprisingly efficient
- ✓ Alternative to congested 900 MHz ISM band
- ✓ Enable non-line-of-site links

AWR
Agility White Space Radio

KTS
Wireless
Product Vision

What's in the box...



**Antenna
(Sold Separately)**

**3-4 ft Cable
(N to TNC)**

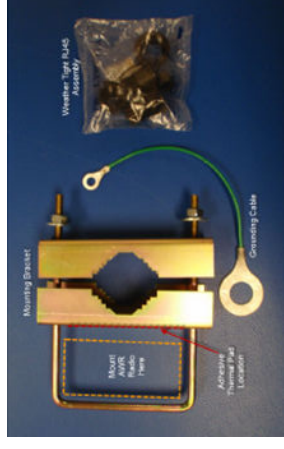
**AWR (Hub or
Spoke Capable)**

Pole Mount Kit

**N-female
RF Interface**

**PoE Ethernet
Interface**

AWR Kit



Case Study: Perimeter Security

Wilmington, NC

Challenge: Can Public Safety wireless video surveillance equipment be deployed cost effectively in a difficult environmental condition, without disturbing the natural setting?

- **Arlie Gardens** - A Southern treasure offering formal gardens, wildlife, historic structures, walking trails, sculptures, 10-acres of freshwater lakes and more than 100,000 azaleas.
- Successfully installed Hub & Spoke configurations ranging from 0.25-0.75 mile with bandwidth up to 2 Mbps.

"...connecting Airlie to Wi-Fi would have cost a fortune and been impossible without digging up the ground to trench wires." Jim McDaniel, Director



Case Study: Environmental Monitoring

New Hanover County, NC

Water Quality Monitoring in Intracoastal Waterway and Tidal Creeks

Challenge: Provide a cost effective solution to wirelessly access water quality monitors in difficult and hard to reach environmental locations represented all around the county.

- The KTS AWR using UHF frequencies successfully closed long distance links through difficult outdoor terrain.
- The AWR can provide Broadband or SCADA+ data rates.
- The AWR is well suited to Solar Powered applications and is a proven outdoor solution.



This technology enables remote monitoring and management of wetland areas eliminating the costs of physically driving or boating to collect data.

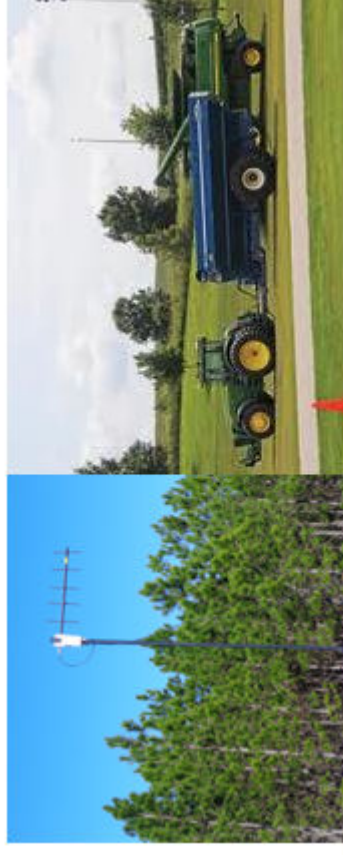
Case Study: Precision Agriculture

Wireless Farm Applications

Challenge: Provide reliable wireless connectivity for applications which require range and signal integrity beyond that provided by Wi-Fi or 900MHz technologies to enable:

- Irrigation Control & Status
- Soil sensor/well monitoring
- Video Security
- Autonomous Vehicles Control
- Large Workyard IP Applications

"Now this is something I can work with."
Dustin Springman, Ag-Technologies

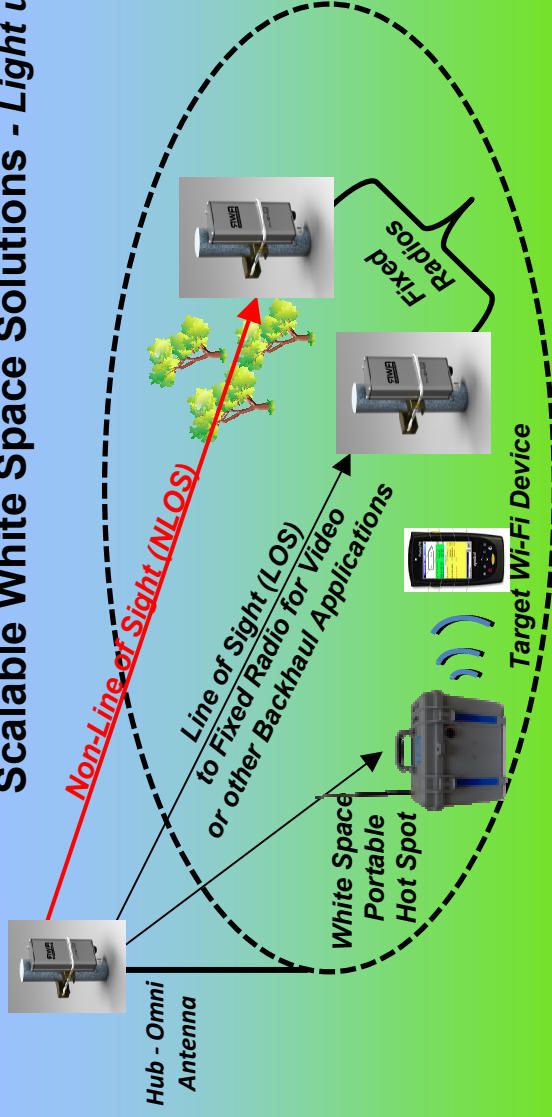


Case Study: Logistics Management

White Space-Enabled RFID/RTLS Systems



Scalable White Space Solutions - Light up part of the yard, or the whole yard!



**Portable White Space-Enabled
Wi-Fi Hot Spot**

**Up to 65% less cost of
site-wide Wi-Fi solutions**

