



# TV White Spaces

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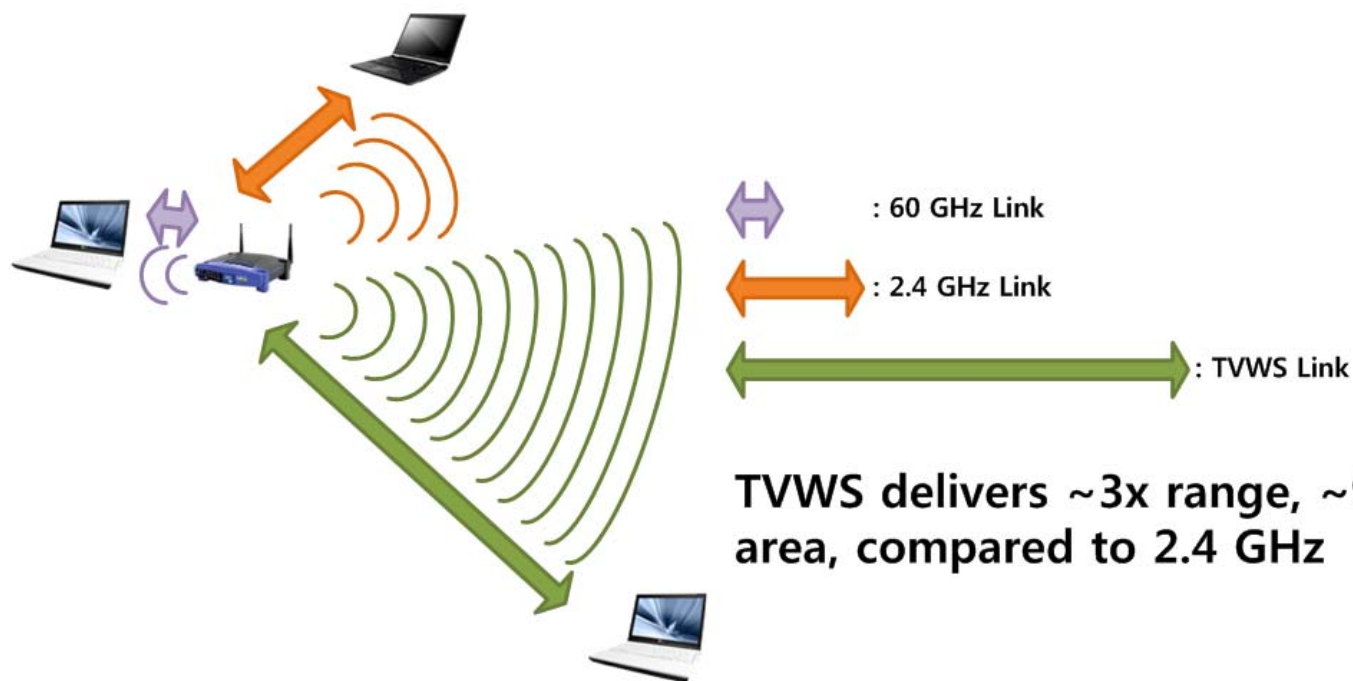
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June 15, 2010

## TVWS extends Wi-Fi into new spectrum with better coverage

- TVWS has superior propagation and extends the reach of wireless networks and it enables:
- Wireless networking with longer range
  - TVWS Wi-Fi network can be established with fewer APs / Repeaters
  - TVWS Wi-Fi as a supplement to current Wi-Fi, can fill the coverage holes that are not covered by current Wi-Fi.



**TVWS delivers ~3x range, ~9x total area, compared to 2.4 GHz**

# Beachfront or Beachhead

## ▶ Beachfront

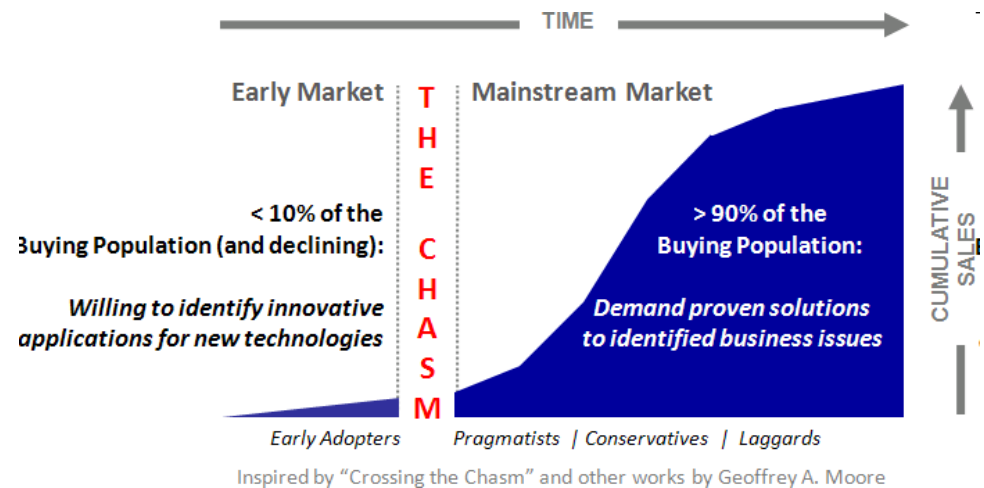
- TV White Spaces has many interesting technical attributes ....

## ▶ Beachhead

- Will there be a viable market?
- Will chip makers invest?

## ▶ The Chasm

- Mandatory sensing – too many false positives and not future proof
- Uncertainty market access based on delays in FCC rulings
- Too many holes in the spectral Swiss Cheese



# Different views of the Beach

## Niche Market

- ▶ \$500 TVWS Radio
  - Experimental Prototypes
  - Limited Niche Applications
  
- ▶ Investment
  - Minimal development costs

## Consumer Market

- ▶ \$5 TVWS Radio
  - Consumer Products
  - Mass market and new innovative applications
  
- ▶ Investment
  - Significant (per product company)
  - Many millions per chip development



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# Creating a Beachhead for TVWS

## The Chasm

- ▶ Mandatory sensing – too many false positives and not future proof
- ▶ Uncertainty market access based on delays in FCC rulings
- ▶ Too many holes in the spectral Swiss Cheese
- ▶ Standards
- ▶ Ecosystem of products
- ▶ Market

## Bridging the Chasm

- ▶ FCC rule changes required (optional sensing, multiple databases, etc.)
- ▶ FCC rule changes and consistency of support for TVWS
- ▶ FCC guidelines, re-banding and better microphone policies
- ▶ Wi-Fi Alliance and IEEE 802.11
  - Real product vendor participation
- ▶ Vendor investments in products as extensions of existing Wi-Fi products
- ▶ Consumer mass market
  - Laptops, phones, routers, and yet to be invented innovations