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ATTORNEYS AT LAW

March 14, 2007

**Via Electronic Filing**

Ms. Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

*Re: Notice of Ex Parte Communication, ET Docket Nos. 04-186, 02-380*

Dear Ms. Dortch:

On March 13, 2007, on behalf of a coalition that includes Dell, Inc., Google, Inc., the Hewlett-Packard Co., Intel Corp., Microsoft Corp., and Philips Electronics North America Corp., Srihari Narlanka of Microsoft; William Brown and John Clark, outside consultants to Microsoft; and Edmond Thomas and S. Roberts Carter of Harris, Wiltshire & Grannis LLP submitted a prototype TV band device to the FCC Laboratory for testing. The above-named individuals also met with Rashmi Doshi, Steven Jones, and Steven Martin of the Office of Engineering and Technology to provide instruction on the operation of the device.

On March 14, 2007, Messrs. Thomas, Narlanka, Brown, and Clark met with Messrs. Doshi and Jones as well as Thomas Phillips of the OET staff to discuss further the operation of the device. In addition, the Coalition provided OET staff with a copy of the device manual, attached hereto.

Pursuant to the Commission's rules, a copy of this notice is being filed electronically in the above-referenced dockets. If you require any additional information please contact the undersigned at (202) 730-1305.

Sincerely yours,

*/s/ Edmond J. Thomas*

Edmond J. Thomas  
Senior Policy Advisor

**HARRIS, WILTSHIRE & GRANNIS LLP**

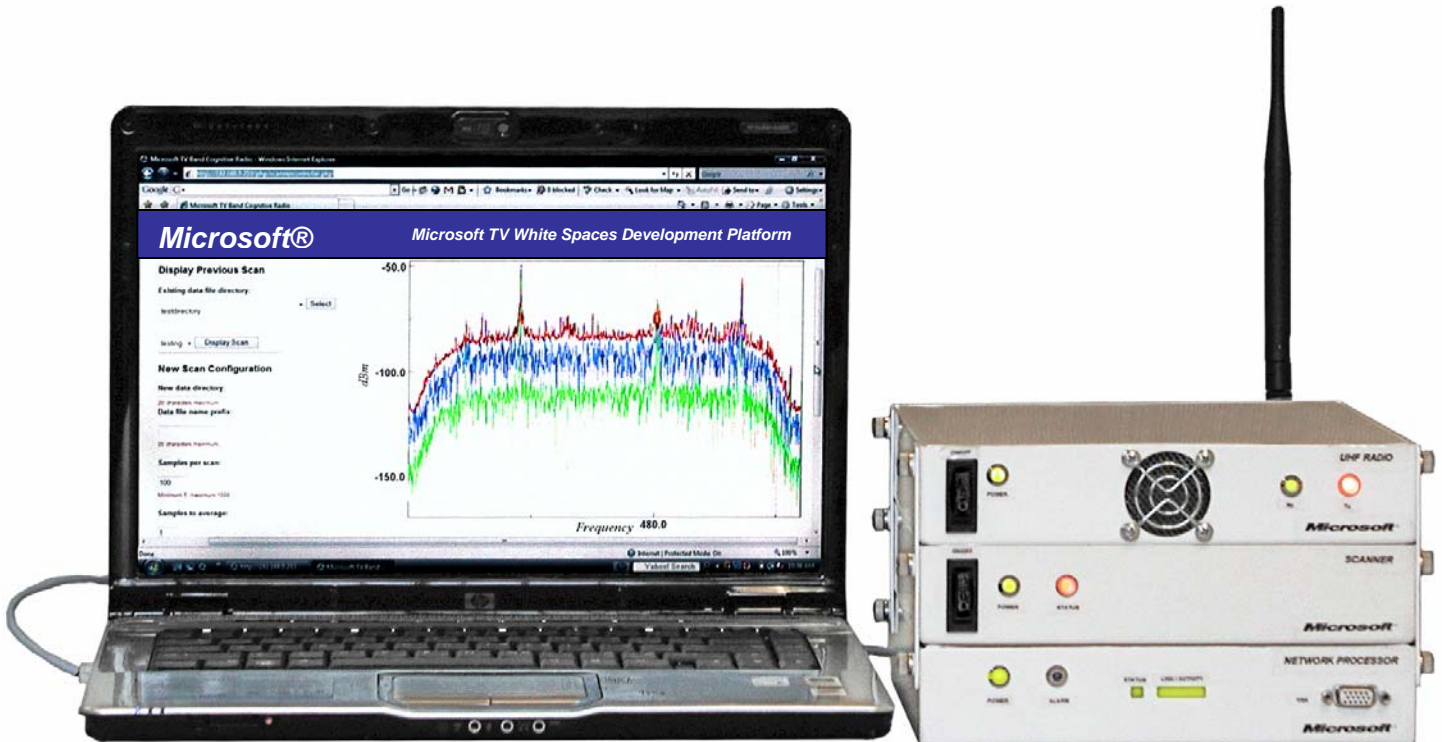
Marlene H. Dortch

March 14, 2007

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cc: Julius Knapp  
Rashmi Doshi  
Steven Jones  
Steven Martin  
Thomas Phillips

# Microsoft TV White Spaces Development Platform Version 1



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System Overview  
Demonstrator

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## 1. SYSTEM OBJECTIVE AND OVERVIEW

The Microsoft TV White Spaces Development Platform is a development platform to explore, develop and evaluate technologies required to create a commercially viable cognitive radio-based communications network product. With the Microsoft Cognitive Radio, developers will be able to:

- Create spectrum scanning and signal feature recognition software and hardware used to co-exist and avoid interfering with incumbent operators.
- Develop and refine transmit power control algorithms.
- Explore and test waveforms and modulation techniques with minimal interference with expected TV band signals.
- Perform on-air propagation and coverage measurements.

## 2. SYSTEM OPERATION

The Microsoft TV White Spaces Development Platform assembly consists of two core system assemblies:

- A Wide-band Spectrum Scanner and Network Processor and a tunable UHF Half-Duplex Transceiver controlled by the Network Processor; and
- A Windows-based PC using the Internet Explorer browser as the command and control interface.

### 2.1 System Operation

- A broadband 521 to 698 MHz computer controlled frequency scanner and high-speed digitizer capable of incrementally scanning UHF TV channels 21 through 51 in 6 MHz segments. The digitized time domain 6 MHz scan information is passed to the network analyzer where a 2048 FFT is performed.
- Signal feature templates for DTV, NTSC and wireless microphone devices are sequentially applied to the FFT information to identify occupied DTV or NTSC channels. Non-occupied channels are declared potential white channels and subsequently scanned for potential narrow band incumbents such as wireless microphones.
- Scanner control and discovery information is presented via the Internet Explorer Web Browser.

## 2.2 UHF Radio Network Processor Assembly

The UHF Tx/Rx Assembly consists of three sub-components:

- S-Band (2.4 GHz) 802.11g OFDM modem located in the Network Processor
- Half-duplex S-Band to UHF block converter
- Network Processor Browser for Frequency and Power Control

UHF radio specifications are presented in Table 1.

## 3. **INTERNET EXPLORER SCANNER AND TX PANELS**

The TV white spaces radio assembly is controlled via a Windows® Internet Explorer browser control panel. Specific controls include:

- The ability to select any operating frequency between 521 to 698 MHz in 1 MHz increments
- Tx power output control from -10 dBm to +20 dBm
- Ability to search individual UHF TV channel groups for occupied DTV or NTSC channels.
- Ability to search out candidate white channels for wireless microphone-like signals.

### 3.1 Basic Scanner Specifications

- Frequency Range: 512 to 698 MHz
- Frequency Step: 1 MHz
- Scan Frame Bandwidth: 8 MHz
- Scan Frame FFT Size: 2048 points
- FFT Bin Size: 3.9 KHz
- Minimum Discernible DTV Pilot Tone Sensitivity: - 114 dBm
- Gain Selections: In-line 20 dB, High-Intercept LNA
- Recording Capability: Digitized records of scans can be created and played back for analysis
- Minimum Discernible Wireless Microphone Detection Sensitivity: -114 dBm
- Measurement Accuracy:  $\pm 3$  dB

## UHF RADIO SPECIFICATIONS

<b>S-Band to UHF Translator</b>	
S-Band Modem Tx Output: Frequency range Power Level	2400 to 2500 MHz -10 to +20 dBm
Signal bandwidth	MHz, typical
Signal gain to UHF port	-25 dB to +25 dB Adjustable in 1 dB increments
UHF Tx Output: Frequency range Tx 1 dB Compression	521 to 698 MHz +28 dBm, min. CTPC
Spectral Inversion UHF Tx Tuning Increments	None 1 MHz
<b>UHF to S-Band Translator</b>	
UHF Rx Input: Frequency range Power Level Tuning increments Receive 1 dB compression	521 to 698 MHz -25 to -90 dBm 1 MHz -20 dBm (at the Rx input)
3 dB Rx Signal bandwidth	4.25 MHz
Receive chain gain: UHF to S-Band translation UHF receive band monitor	16 dB, typical 20 dB, typical
Rx Noise Figure	5 dB, max.
S-Band Modem Receiver Input: Frequency range Power Level	2400 to 2500 MHz -75 dBm to -10 dBm, typical
Spectral Inversion	None
<b>Environmental:</b>	
Internal Frequency Reference	10 MHz $\pm$ 2.5 ppm
LO Integrated Phase noise	5° rms, max. (using 1 MHz tuning increments)
Temperature Range (Operating)	10°C to 50°C
All RF Port impedances	50 Ohms, nominal
RF Connectors	SMA, female
Auxiliary RF Ports: S-Band power monitor Scan Rx Separate Rx and Tx antennas	Log detector output UHF receive monitor Factory selected option
DC Power requirements: Voltage Current	+12 $\pm$ 0.1 Vdc 900 mA, typical
Computer control interface	RS-232 Serial or USB
Transmit control interface	Automatic or external
Digital control inputs: External TR Select Reset	Selects either Tx or Rx mode Processor reset
Digital monitor output	TR Mode
LED Indicators	DC Power, Synthesizer Lock, Tx, Rx

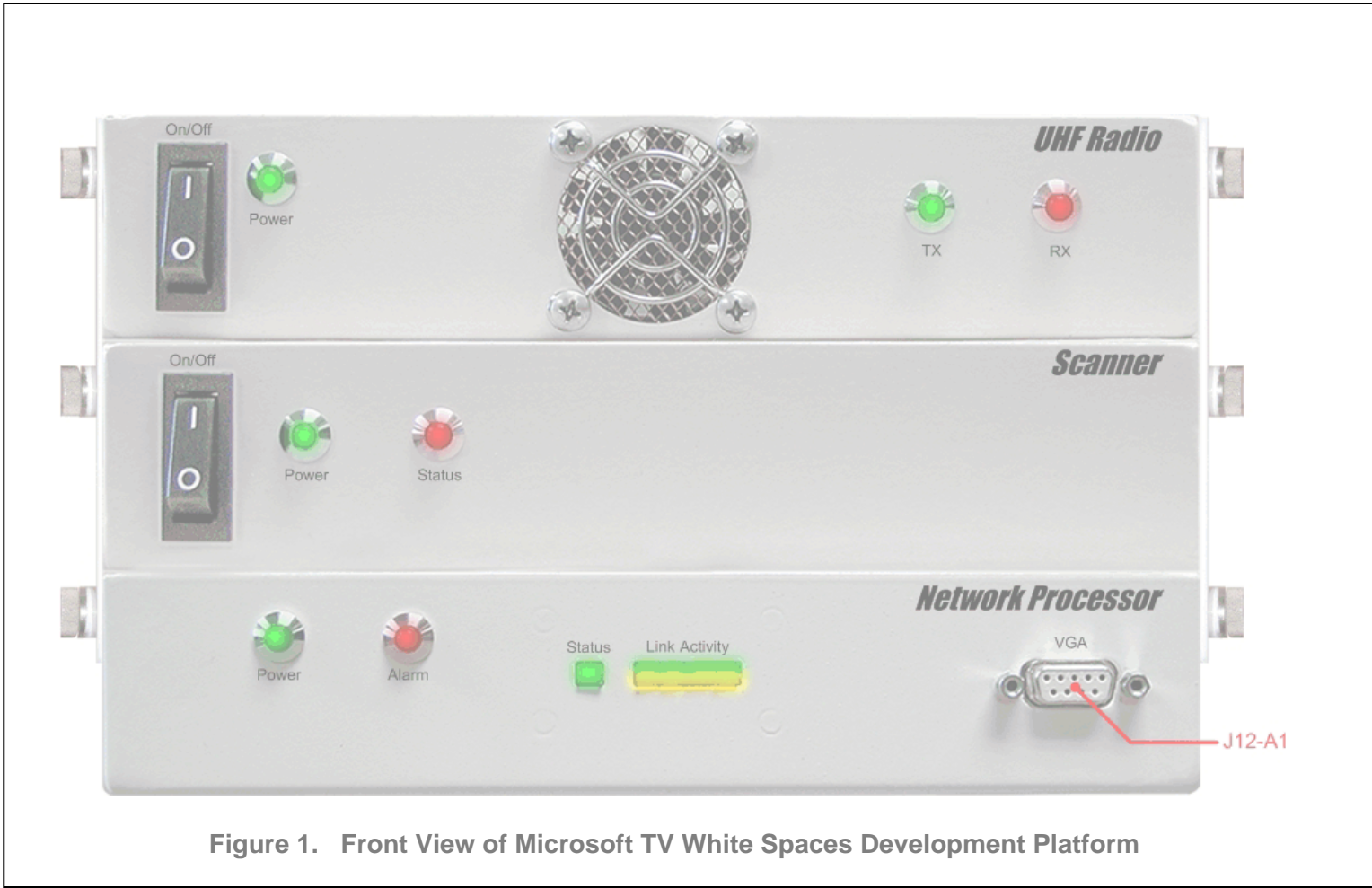
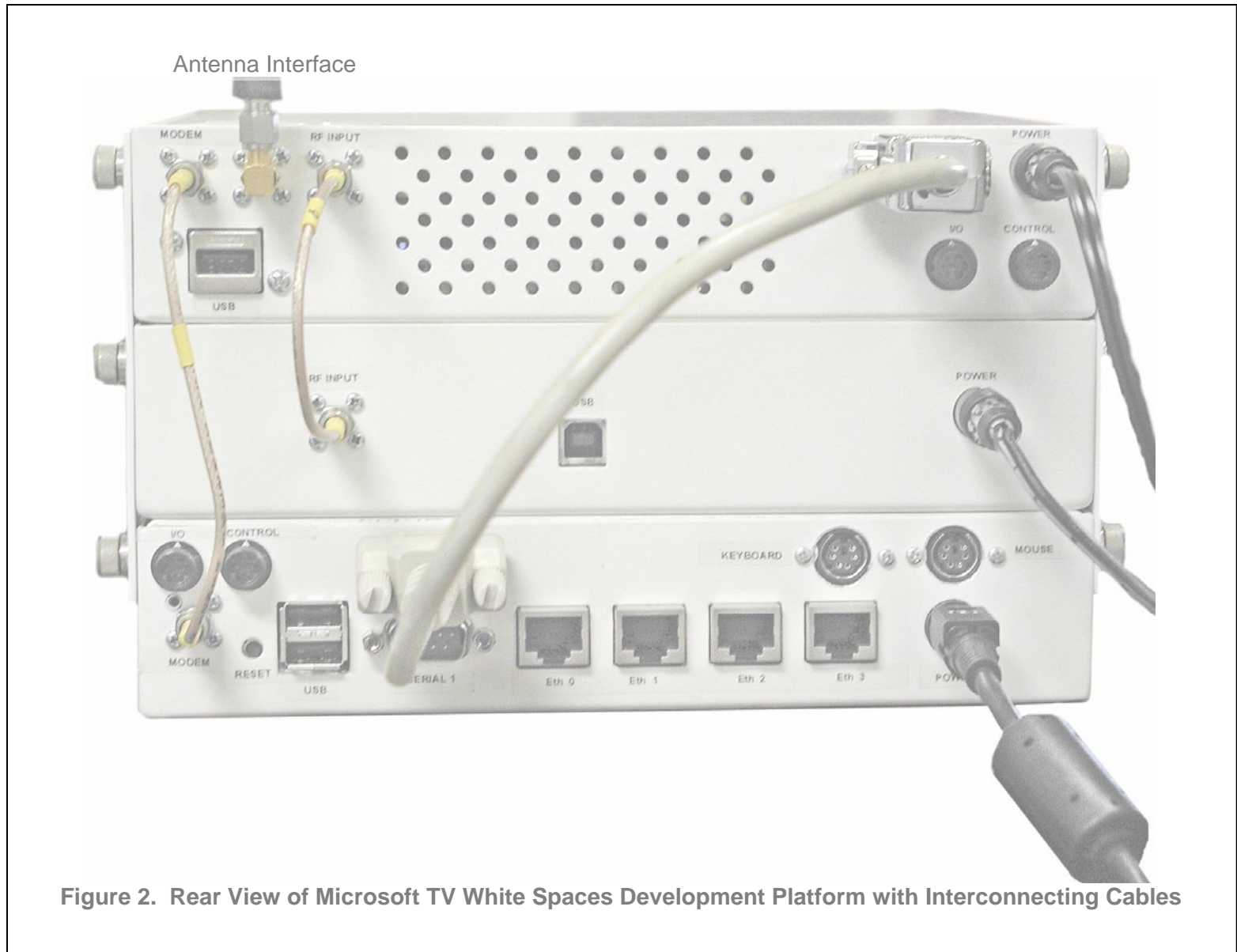
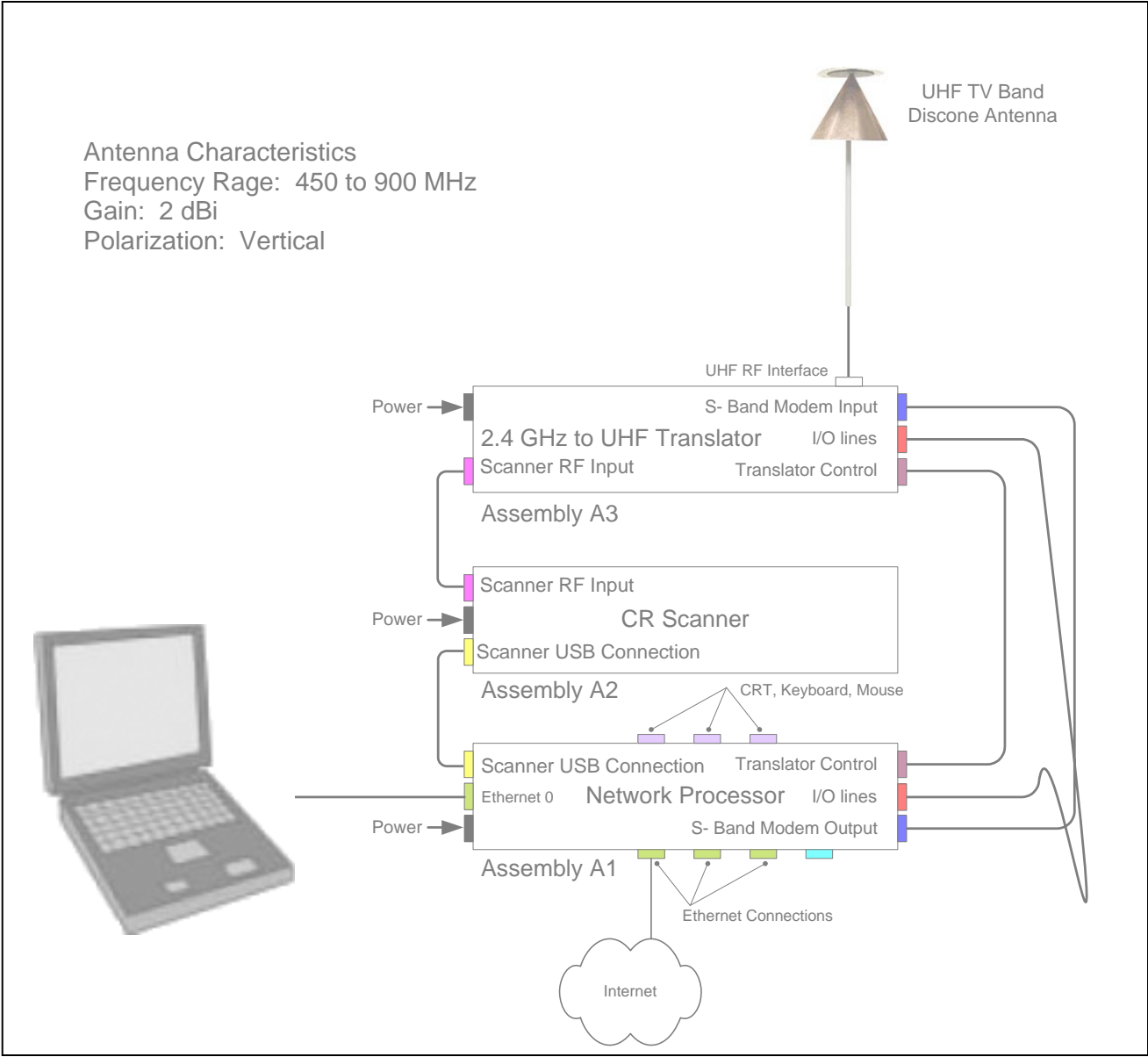


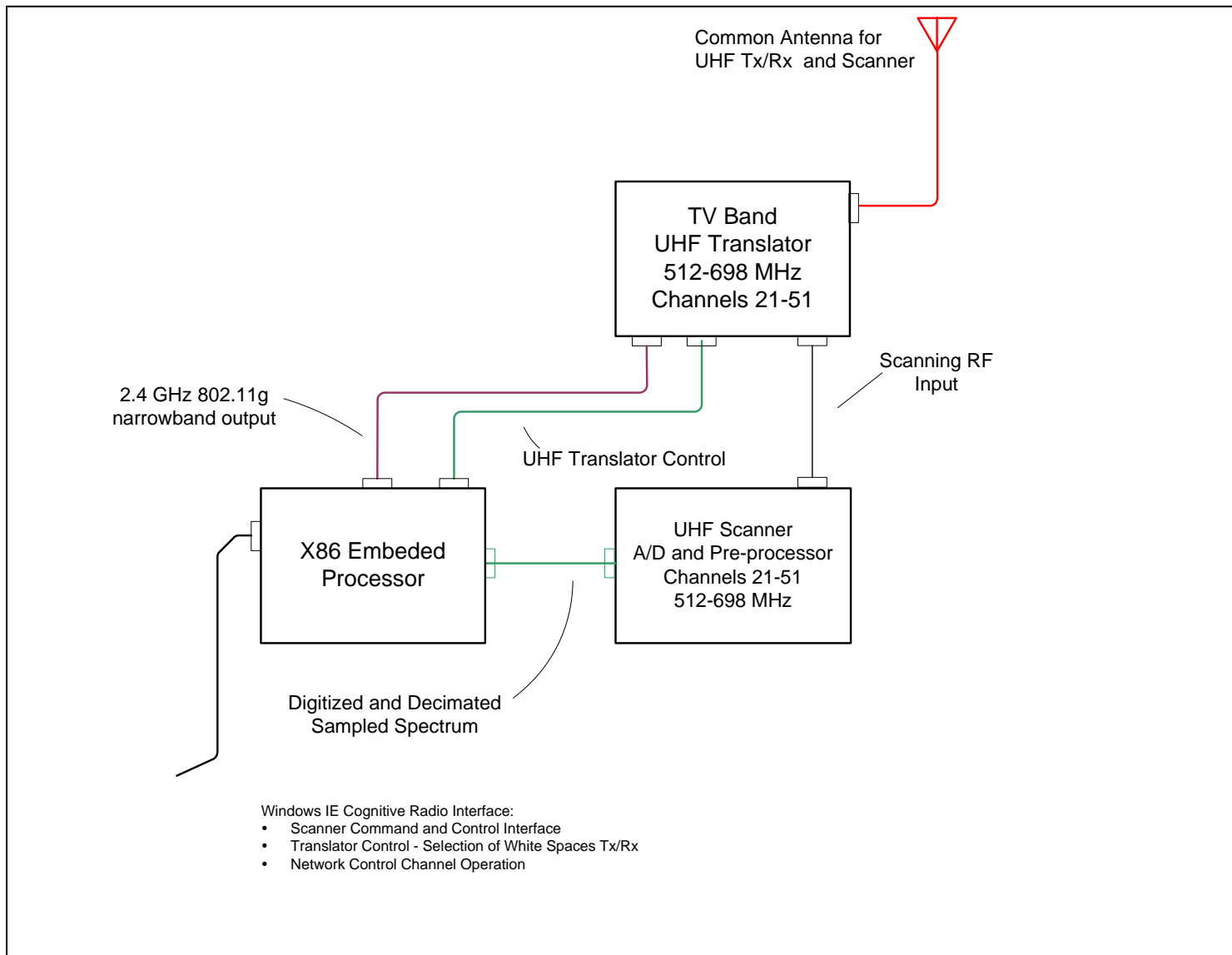
Figure 1. Front View of Microsoft TV White Spaces Development Platform







**Figure 3. System Interconnection Diagram**



**Figure 4. Microsoft TV White Spaces Development Platform Functional Block Diagram**

## Translator Control

Channel: 21  
 Base Frequency: 515 MHz  
 Frequency Offset: 0 MHz  
 New Frequency: MHz  
 Input Attenuation: 0 dB  
 Output Attenuation: 0 dB

Channel  Frequency

Frequency Offset

Center Frequency Offset, MHz

S-Band Input Attenuation

S-Band Input Attenuation, -dB

UHF Output Attenuation

UHF Output Attenuation, -dB

## Translator Diagnostics

Start Frequency: 400 MHz  
 Stop Frequency: 915 MHz  
 Increment: 6 MHz  
 Dwell: 1 seconds  
 Input Attenuation: -0 dB  
 Output Attenuation: -0 dB

Start Frequency:   
 (400 to 914 MHz) Positive values only.

Stop Frequency:   
 (401 to 915 MHz) Positive values only.

Increment:   
 (1 to 100 MHz) Positive values only.

Dwell Time:   
 (1 to 10 seconds) Positive values only.

Input Attenuation:   
 (0 to -31 dB) Positive values only.

Output Attenuation:   
 (0 to -31 dB) Positive values only.

**Figure 5. Translator Control Panel**

## Scanner Controls

**Display a Previous Spectrum Scan**

**Step 1: Choose a directory**

test

Select directory

**Step 2: Choose a data file**

Select data file

**Perform a New Spectrum Scan**

**Samples per scan:**

5

Minimum 5, maximum 1000

---

**Scan type and range:**

Channels  Frequency Range

<input checked="" type="checkbox"/> 21	<input checked="" type="checkbox"/> 32	<input checked="" type="checkbox"/> 43
<input checked="" type="checkbox"/> 22	<input checked="" type="checkbox"/> 33	<input checked="" type="checkbox"/> 44
<input checked="" type="checkbox"/> 23	<input checked="" type="checkbox"/> 34	<input checked="" type="checkbox"/> 45
<input checked="" type="checkbox"/> 24	<input checked="" type="checkbox"/> 35	<input checked="" type="checkbox"/> 46
<input checked="" type="checkbox"/> 25	<input checked="" type="checkbox"/> 36	<input checked="" type="checkbox"/> 47
<input checked="" type="checkbox"/> 26	<input checked="" type="checkbox"/> 37	<input checked="" type="checkbox"/> 48
<input checked="" type="checkbox"/> 27	<input checked="" type="checkbox"/> 38	<input checked="" type="checkbox"/> 49
<input checked="" type="checkbox"/> 28	<input checked="" type="checkbox"/> 39	<input checked="" type="checkbox"/> 50
<input checked="" type="checkbox"/> 29	<input checked="" type="checkbox"/> 40	<input checked="" type="checkbox"/> 51
<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 41	<input checked="" type="radio"/> Check All
<input checked="" type="checkbox"/> 31	<input checked="" type="checkbox"/> 42	<input type="radio"/> Clear All

Start Frequency:  MHz Stop Frequency:  MHz

Minimum 400 MHz Minimum 401 MHz

Maximum 849 MHz Maximum 850 MHz

Start Frequency must be below Stop Frequency

---

**Data file directory:**

Existing directory

20061228\_Threshold\_Tests\_chnls\_25\_55

New Directory

20 characters maximum.

---

**Data file name prefix:**

new\_scan

20 characters maximum.

Apply

**Scanning Parameters:**

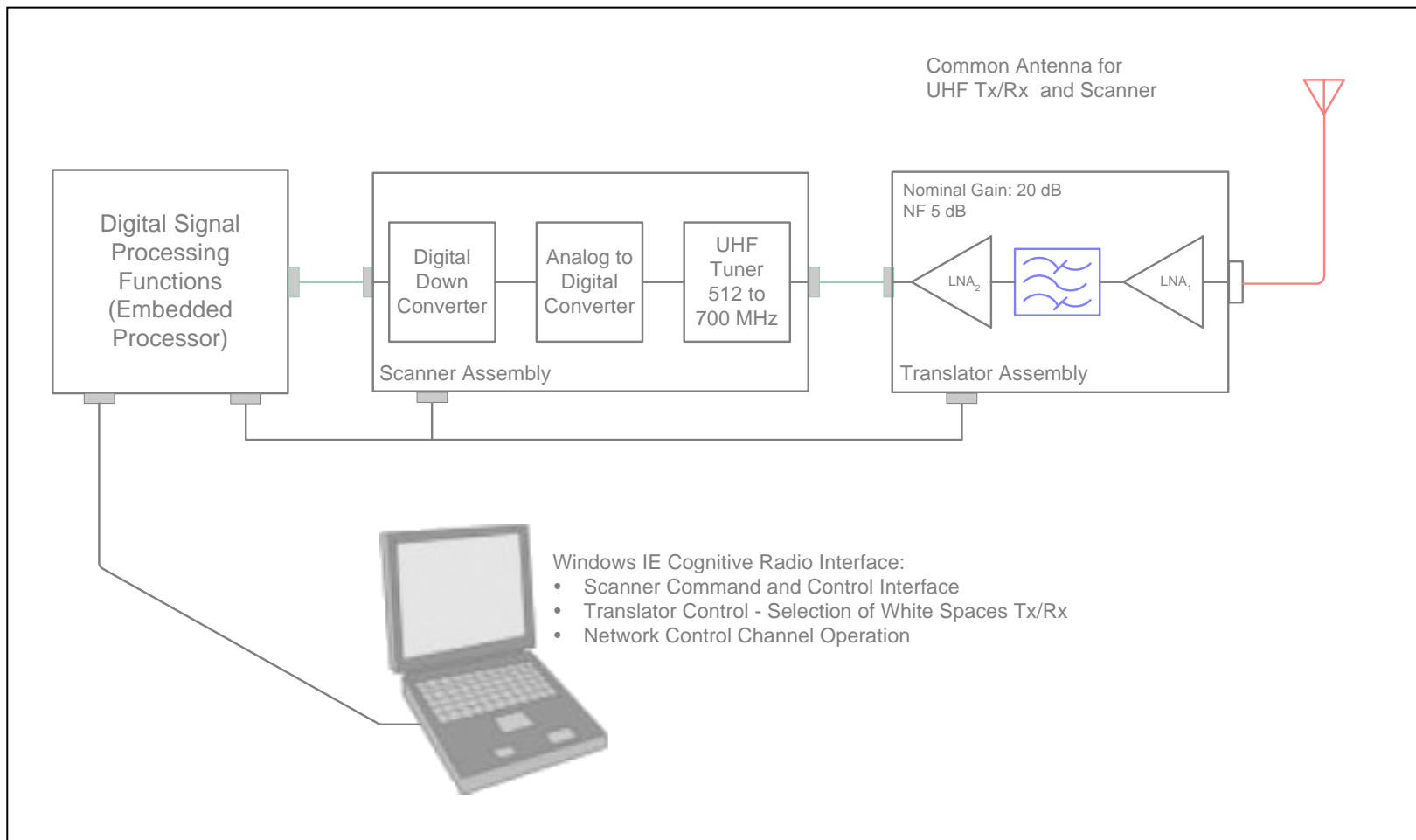
Channel 21, 515 MHz  
 Channel 22, 521 MHz  
 Channel 23, 527 MHz  
 Channel 24, 533 MHz  
 Channel 25, 539 MHz  
 Channel 26, 546 MHz  
 Channel 27, 551 MHz  
 Channel 28, 557 MHz  
 Channel 29, 563 MHz  
 Channel 30, 569 MHz  
 Channel 31, 575 MHz  
 Channel 32, 581 MHz  
 Channel 33, 587 MHz  
 Channel 34, 593 MHz  
 Channel 35, 599 MHz  
 Channel 36, 605 MHz  
 Channel 37, 611 MHz  
 Channel 38, 617 MHz  
 Channel 39, 623 MHz  
 Channel 40, 629 MHz  
 Channel 41, 635 MHz  
 Channel 42, 641 MHz  
 Channel 43, 647 MHz  
 Channel 44, 653 MHz  
 Channel 45, 659 MHz  
 Channel 46, 665 MHz  
 Channel 47, 671 MHz  
 Channel 48, 677 MHz  
 Channel 49, 683 MHz  
 Channel 50, 689 MHz  
 Channel 51, 695 MHz

Samples per scan:  
5

Directory:  
20061228\_Threshold\_Tests\_chnls\_25\_55

File:  
new\_scan

**Figure 6. Scanner Control Panel**



**Figure 7. Scanner Functional Flow**