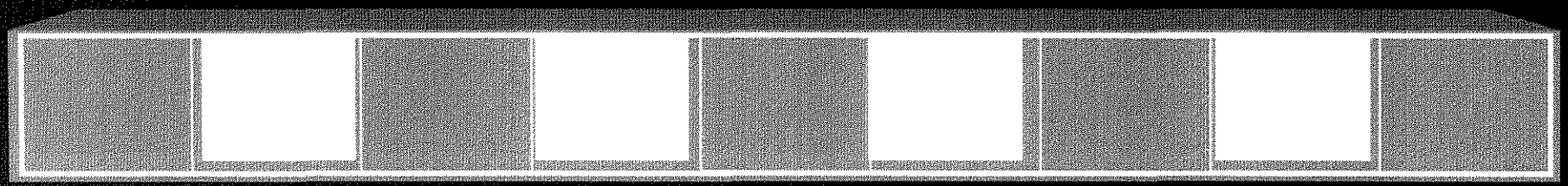
TV White Spaces
Unlicensed Devices

Threat to the DTV transition and our digital future

Television Spectrum

Future TV Band Ch. 2 - 51



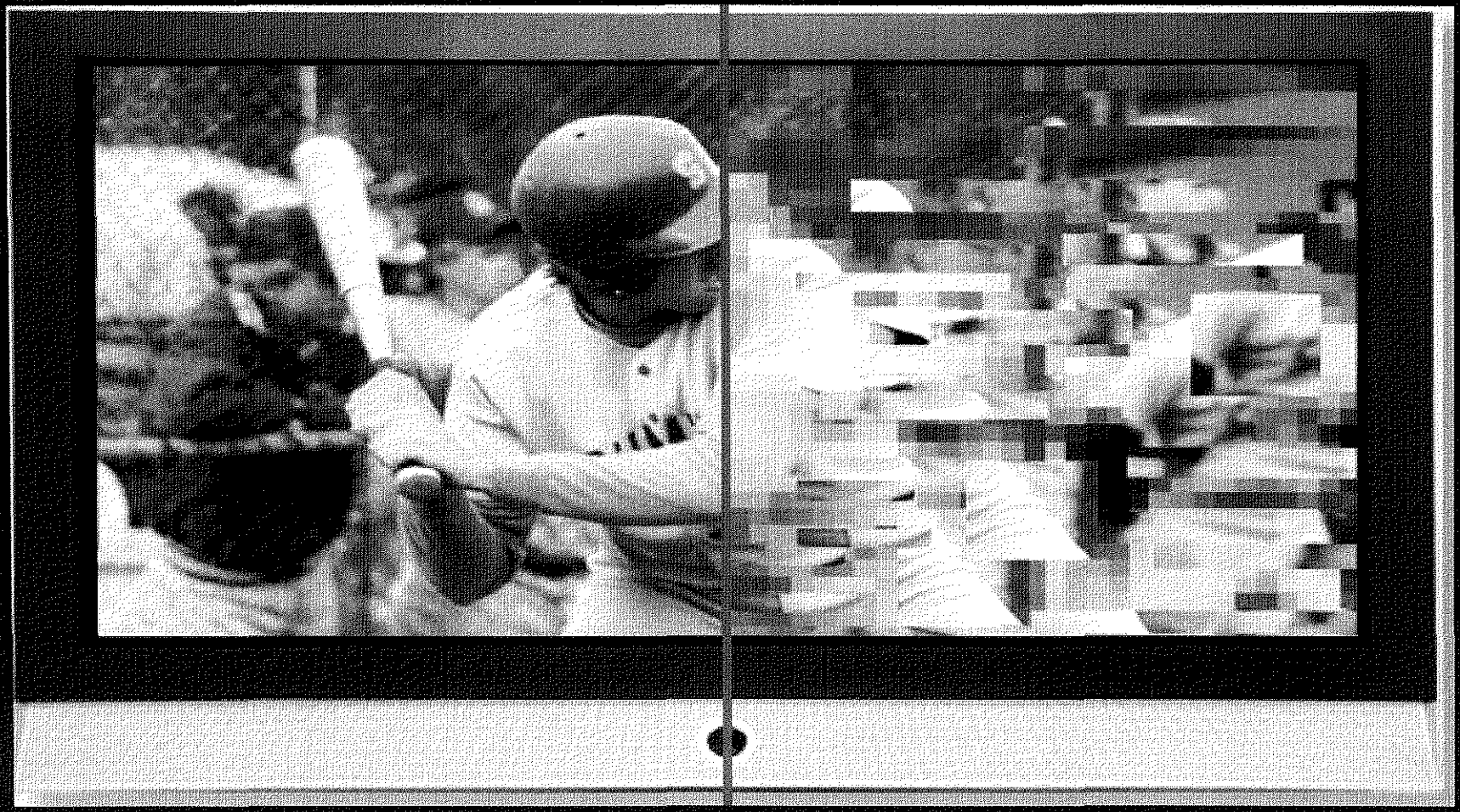
So-called vacant TV channels

Occupied TV Channels

Note: these frequencies are heavily used for licensed wireless microphones by news and sports departments.

Small Amount of Interference Makes the DTV Picture Unwatchable

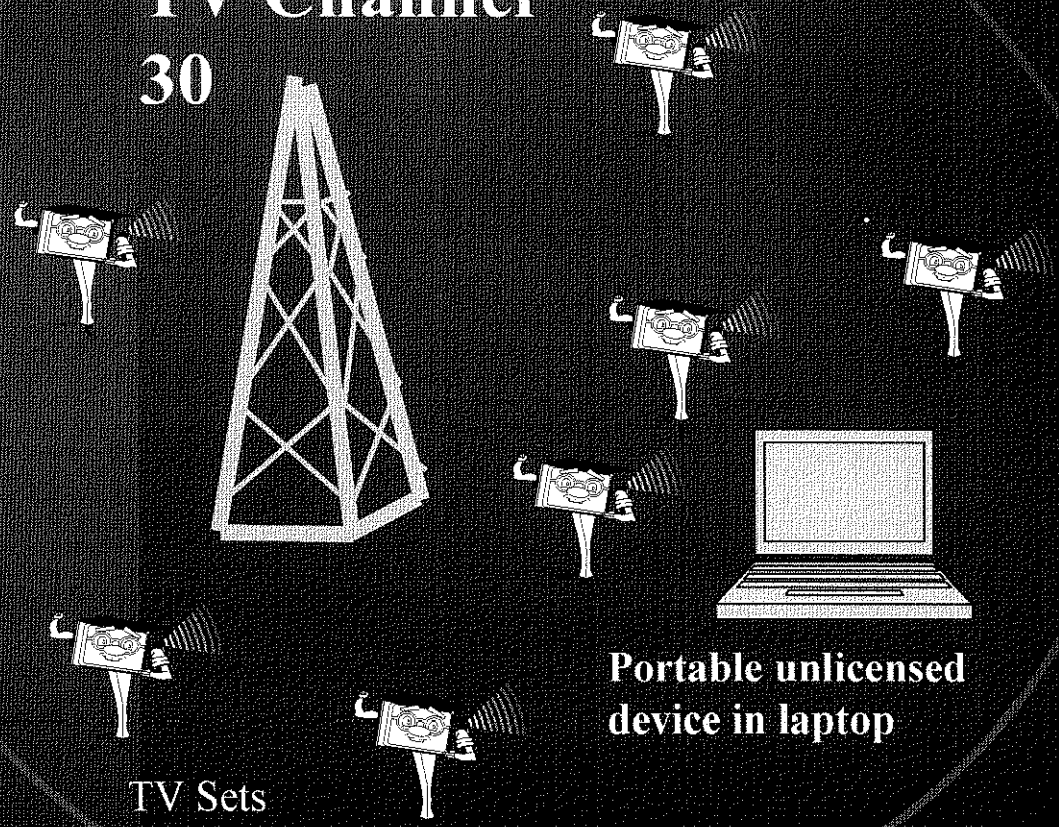
MSTV
MAXIMUM SERVICE TELEVISION



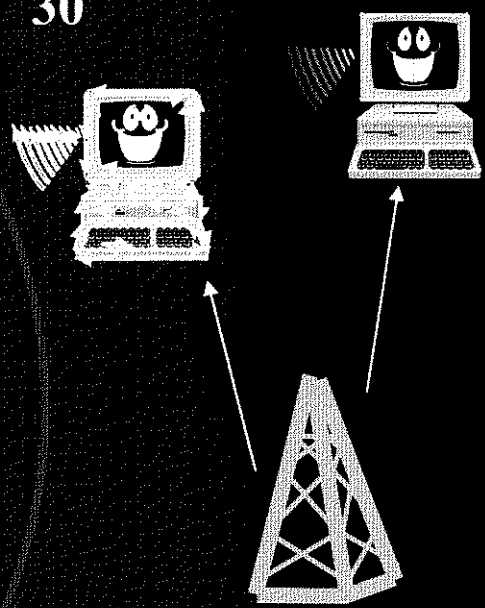
Crystal Clear

Interference

Fixed vs. Personal Portable Devices



Fixed unlicensed system operating on co-channel TV-30



Unlicensed base station located outside station contour via geolocation. This system avoids interference!

MSTV
MAXIMUM SERVICE TELEVISION

Interference distances from a very low power (100 mW) unlicensed device to a digital TV set

Out of Band

75 feet

Adjacent Channel

Up to a **hundred meters** depending on digital TV set!

Co-channel

Up to 75 sq. miles!!

FCC Report: Sensing Technology Does Not Work

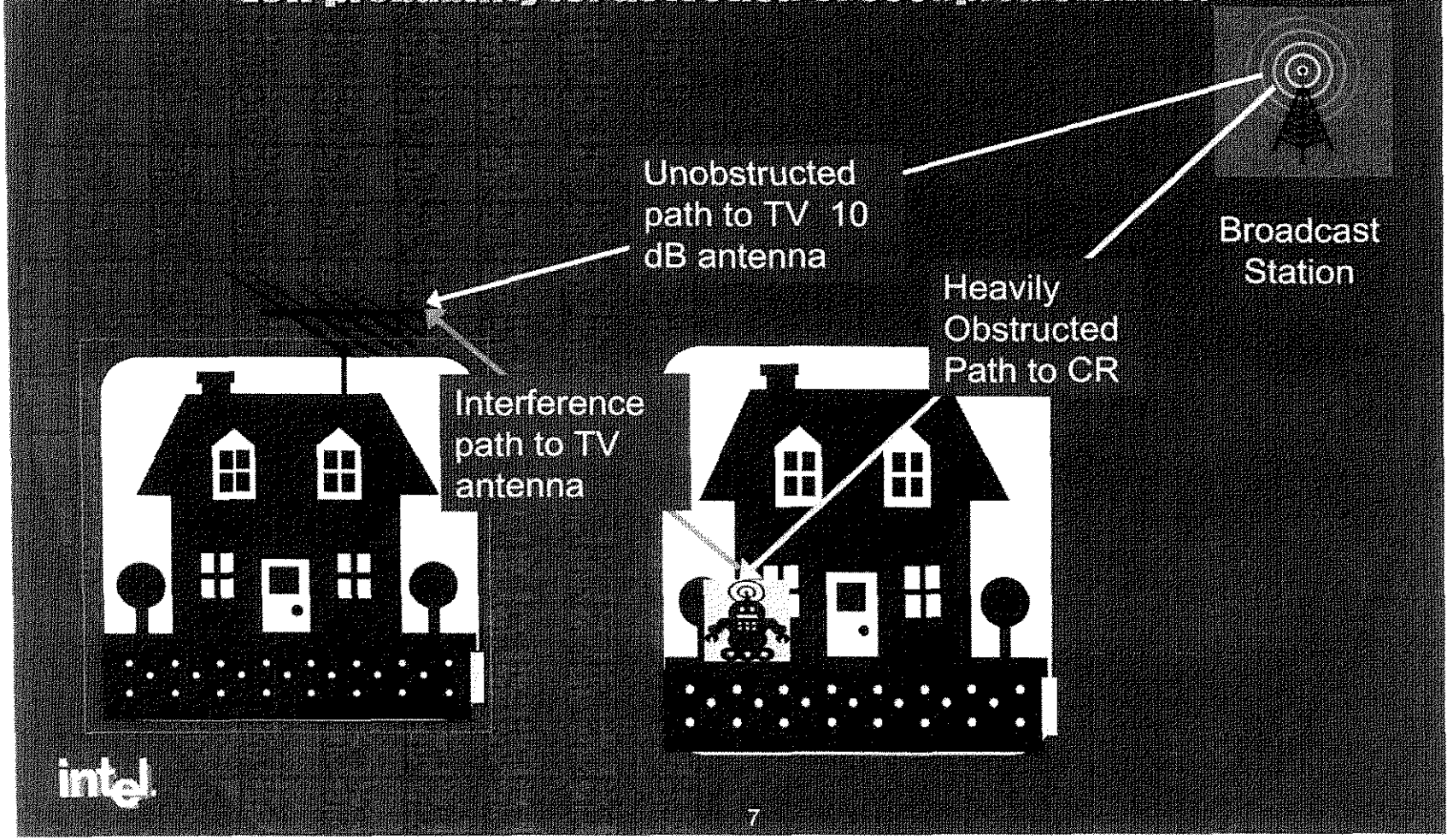
- Sensing TV signal does not work: (FCC Report July 31, 2007)
  - Microsoft Prototype:
    - Failed to detect a broadcast signal 40-75% of the time. The device turned on to channels that were being watched.
    - Transmitter caused interference
  - Philips
    - Only tested in the lab. Philips did not want any field testing.
    - Performed better but dropped off with weak signals that are typical in broadcast service area
- Failed to consistently detect wireless microphones
- **Result is co-channel interference which can range for miles (75 sq. miles)**
- **Your neighbor's device interferes with your TV set**

FCC Report: Sensing Technology Does Not Work

- Even if Devices Worked "As Advertised" they would still cause co-channel interference
  - Sensing level of -114 dBm is not sufficient
  - MSTV study of Washington/Baltimore found receivable signals levels below -114 dBm
  - Devices would turn on to occupied channels

Worst Case Hidden Transmitter Scenario

Low probability for detection of occupied channel

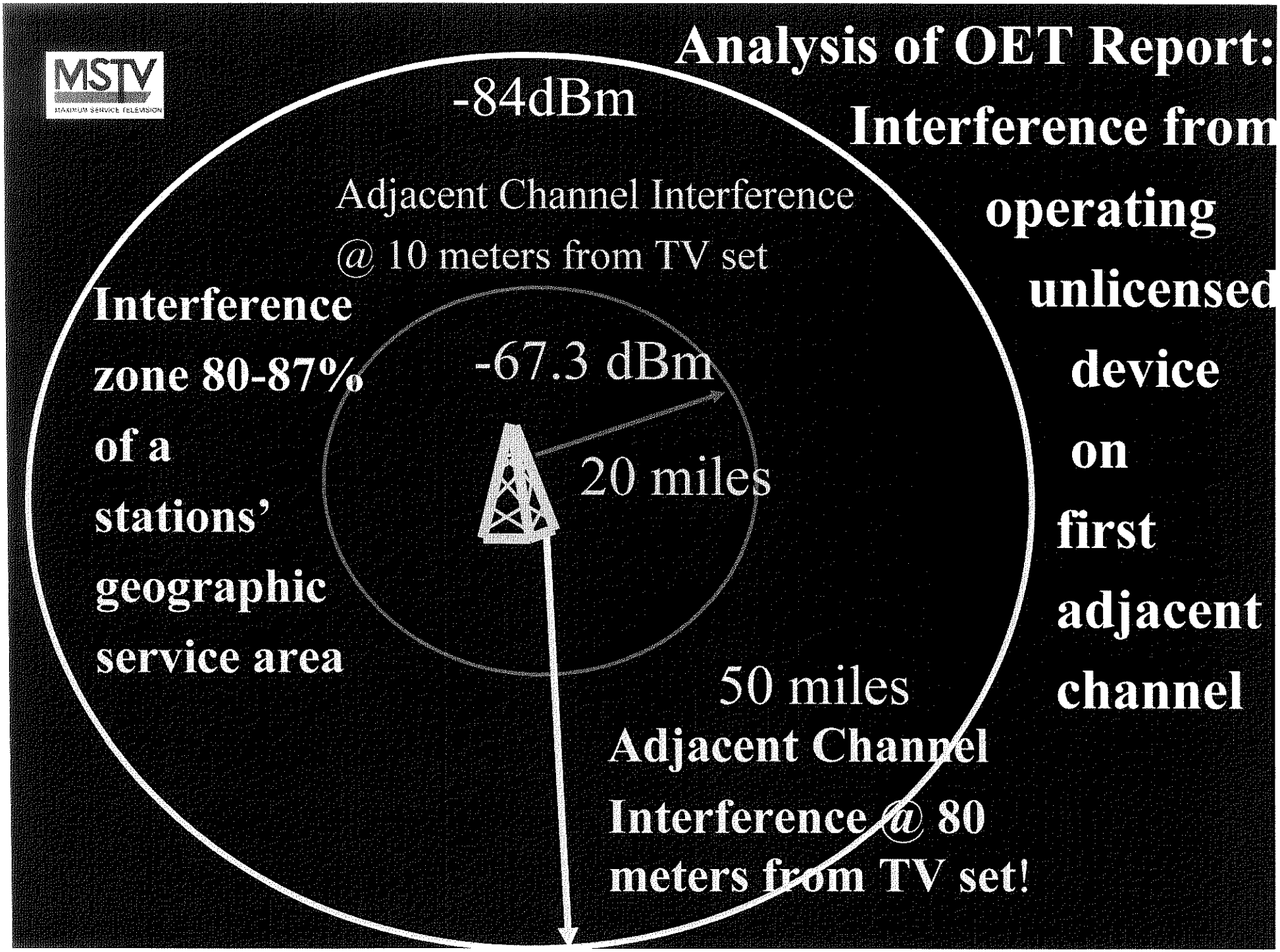


intel

TV White Space: Interference From Adjacent Channel

- Even if sensing worked (it does not), Microsoft & Philips want to operate on the next "vacant" adjacent channel.
- Data from a March, FCC study shows operating on the next adjacent channel" causes interference in a zone equal to **80 -87% of a TV stations service area**
  - At 20 miles from tower, interference range is about 10 meters (30 feet)
  - At 50 miles from tower (well within TV service area) interference range is 80-100 meters.
- Neighbors using a device will interfere with your new digital TV set.
  - If you live in the interference zone your new digital TV set will not work if a neighbor is using an unlicensed device nearby.
  - Even if you are closer than 20 miles, you will receive interference if you receive weak signals due to buildings.

MSTV
MAXIMUM SERVICE TELEVISION


MSTV
MAXIMUM SERVICE TELEVISION
Analysis of OET Report:
Interference from
operating
unlicensed
device
on
first
adjacent
channel
-84dBm
Adjacent Channel Interference
@ 10 meters from TV set
Interference
zone 80-87%
of a
stations'
geographic
service area
-67.3 dBm
20 miles
50 miles
Adjacent Channel
Interference @ 80
meters from TV set!

Impossible to track down and police interference

MSTV