

PHILIPS

Digital Broadcast Content Protection

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Outline

- The Problem
- The Broadcast Flag and MPAA Proposal
- Leaks in the System
- Alternatives to the Broadcast Flag
- Finding a Holistic Solution
- FCC Jurisdiction

The Problem

- Internet redistribution of DTV content
 - Broadcasters and content owners claim their business model is jeopardized if this is allowed
 - Foreign distribution rights
 - Syndication/Re-runs
 - High quality (esp. HDTV) content may be withheld from digital broadcast television without adequate protection
- Protection in this context does not mean prevention of copying, but rather preventing the movement of content to a different geographic area.
 - Also to prevent general availability through the Internet

State of Internet Technology

Current Transfer Speeds for HDTV and SDTV		
Signal	Upload/Download Connection	Time to Transfer a 2-Hour Program
HDTV	1.5 mbps (broadband - max/atypical)	25 hours, 44 minutes
HDTV	1.0 mbps (broadband - typical)	38 hours, 36 minutes
HDTV	56K (dial-up - never actually achieved)	689 hours, 17 minutes (28.7 days)
HDTV	53K (dial-up - actual max)	728 hours, 18 minutes (30.3 days)
HDTV	50K (dial-up - typical)	772 hours (32.2 days)
SDTV	1.5 mbps (broadband - max/atypical)	5 hours, 20 minutes
SDTV	1.0 mbps (broadband - typical)	8 hours
SDTV	56K (dial-up - never actually achieved)	142 hours, 51 minutes (5.9 days)
SDTV	53K (dial-up - actual max)	150 hours, 56 minutes (6.3 days)
SDTV	50K (dial-up - typical)	160 hours (6.7 days)

The state of consumer broadband technology and video compression makes remote the threat of widespread redistribution of high- or even standard-definition digital content over the Internet

State of Compression Technology

- Lossless compression
 - Every bit is preserved
 - Nothing is lost from the original
 - Reduce content size by 50%
 - No prospects for significant improvement
- Lossy compression
 - Bits that you cannot see are removed
 - e.g. HDTV which starts by removing half of the color information
 - Reduce content size by 95%
 - Then it becomes unwatchable
 - **No prospects for significant improvement**

What Is The Broadcast Flag?

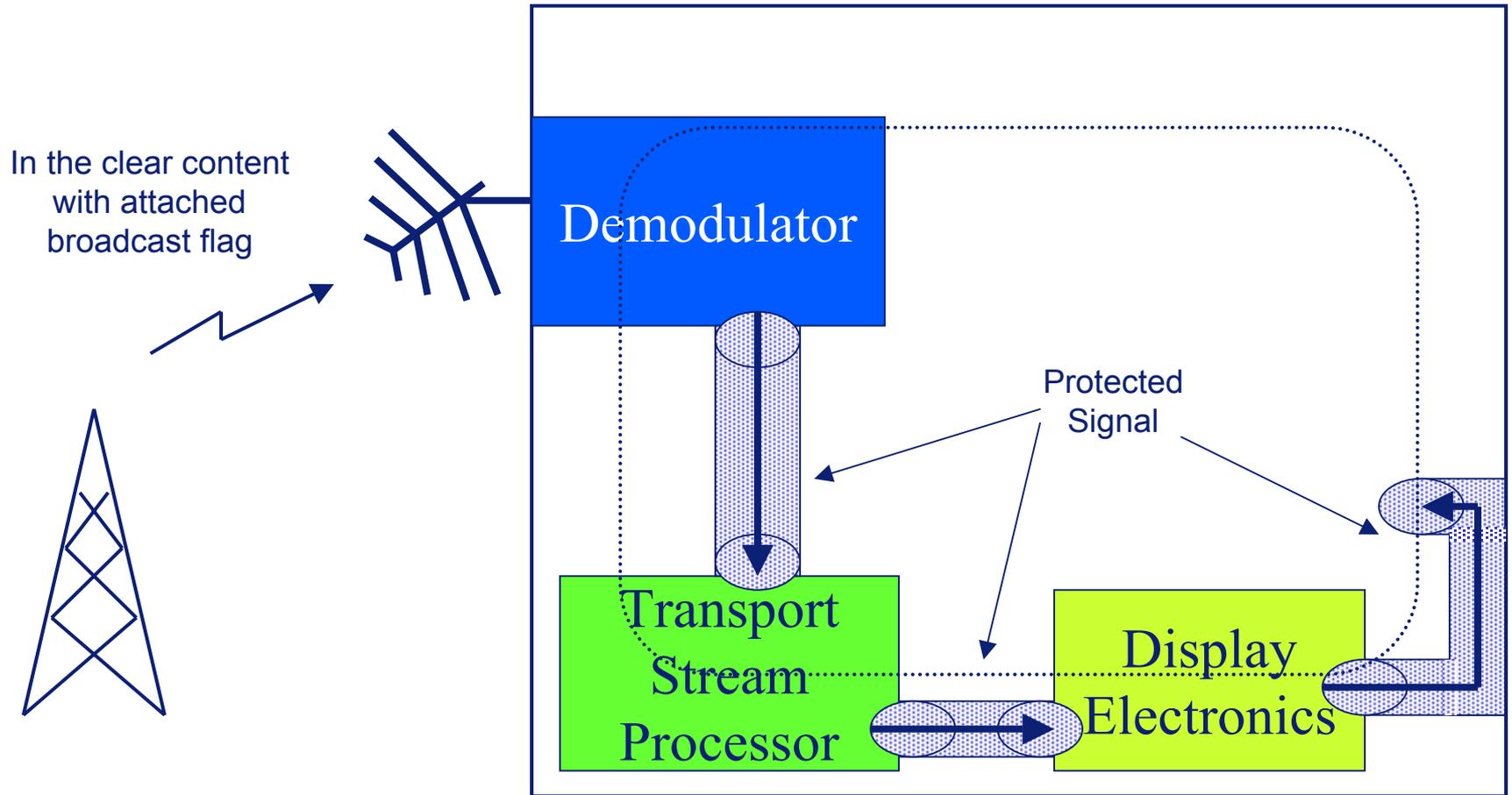
- Described in ATSC Standard A/65A: Program and System Information Protocol for Terrestrial Broadcast and Cable, 31 May 2000
- rc_descriptor
 - Unique tag (0xAA) whose presence indicates that redistribution should be controlled
- Present in both Event Information Table (EIT) and Program Map Table (PMT)
 - PMT data guaranteed present in broadcast and cable
- **In and of itself, the flag contains no information; only its presence or absence is important**

How Does the Broadcast Flag Work?

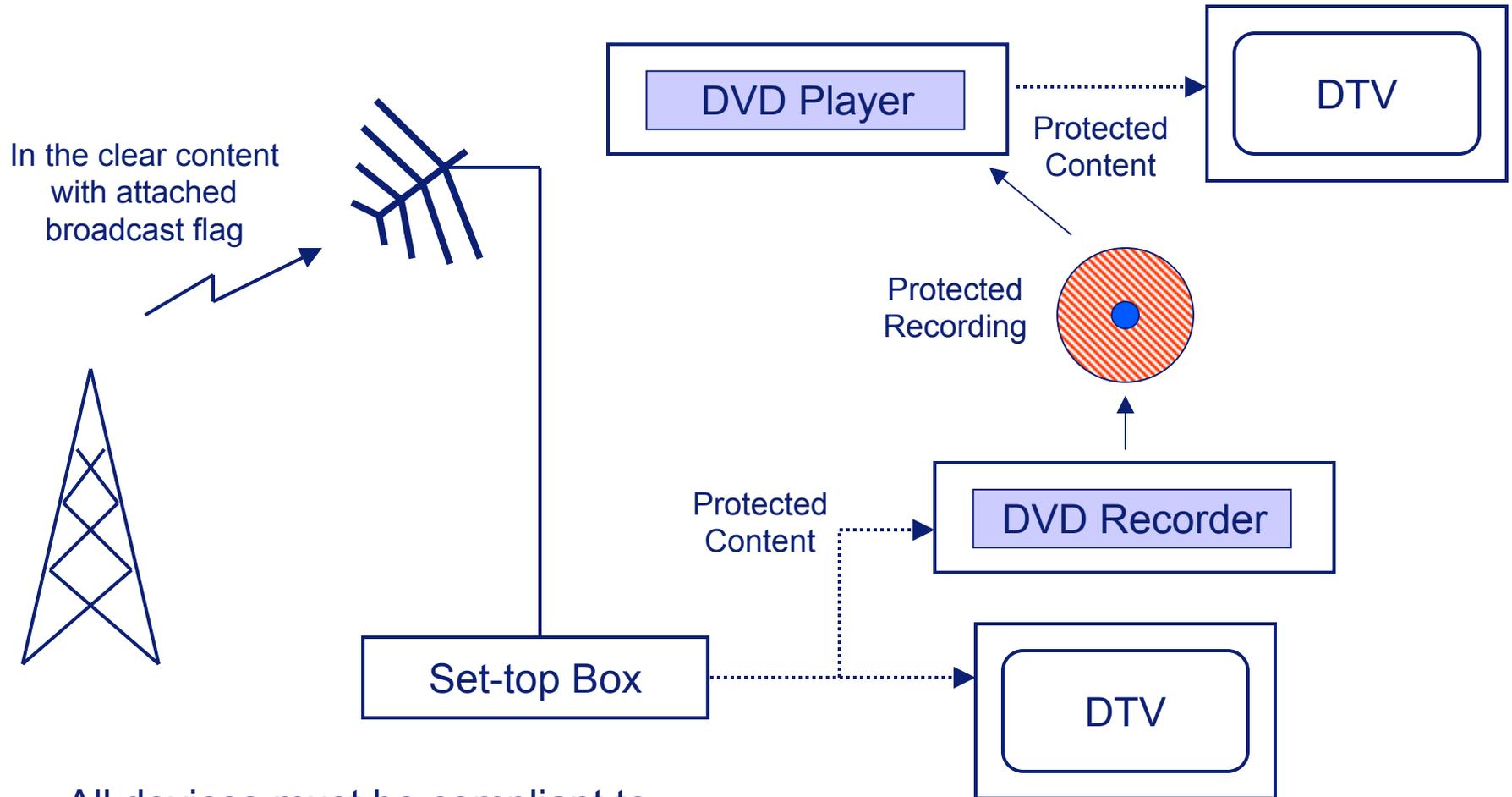
MPAA Proposal:

- Protection/encryption scheme throughout digital home network from moment of reception
- Compliance and robustness rules
 - Apply to (or affect functionality of) any device that comes into contact with protected content
- Studio-dominated selection criteria for digital content protection technology

How It Works Inside Compliant Devices

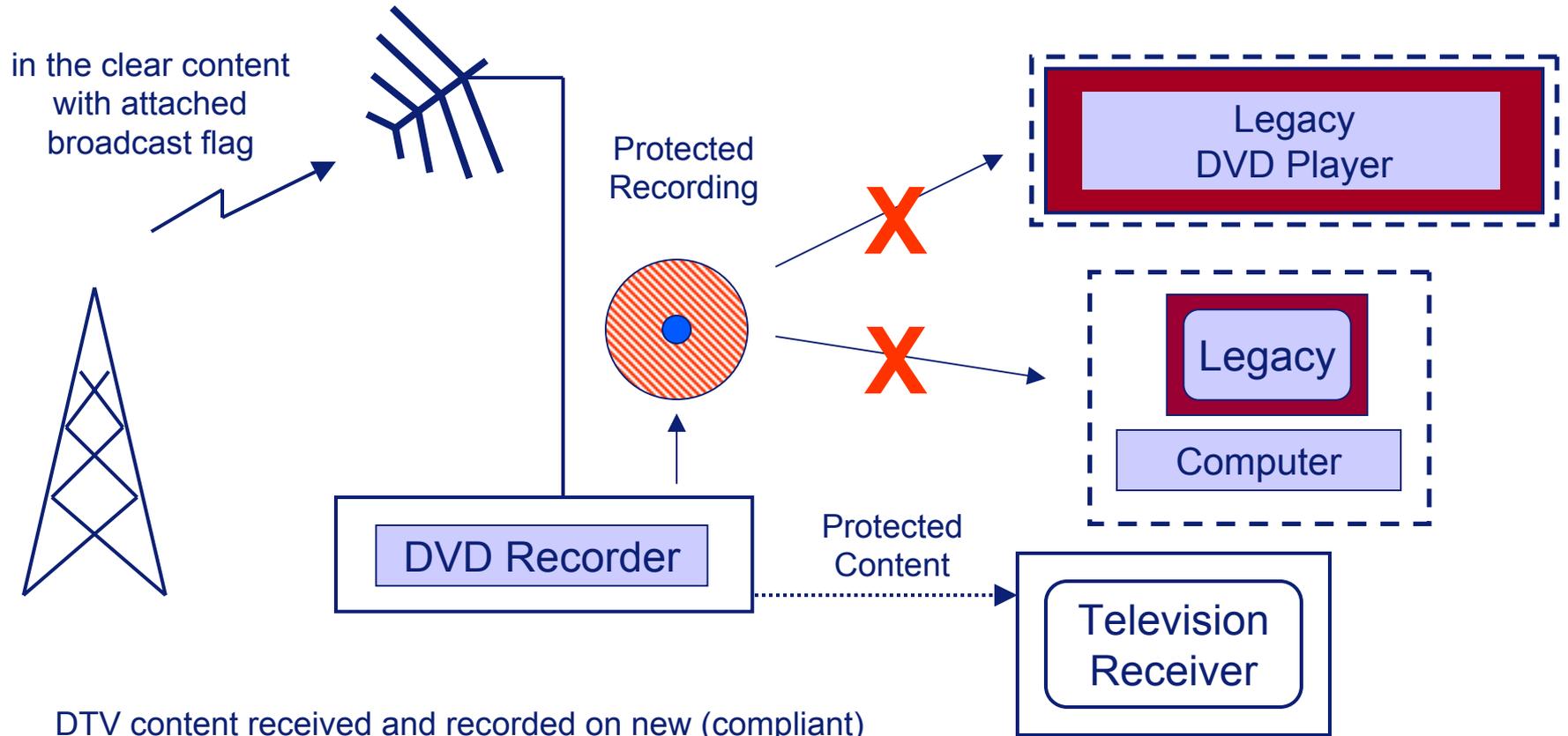


How It Works Among Compliant Devices



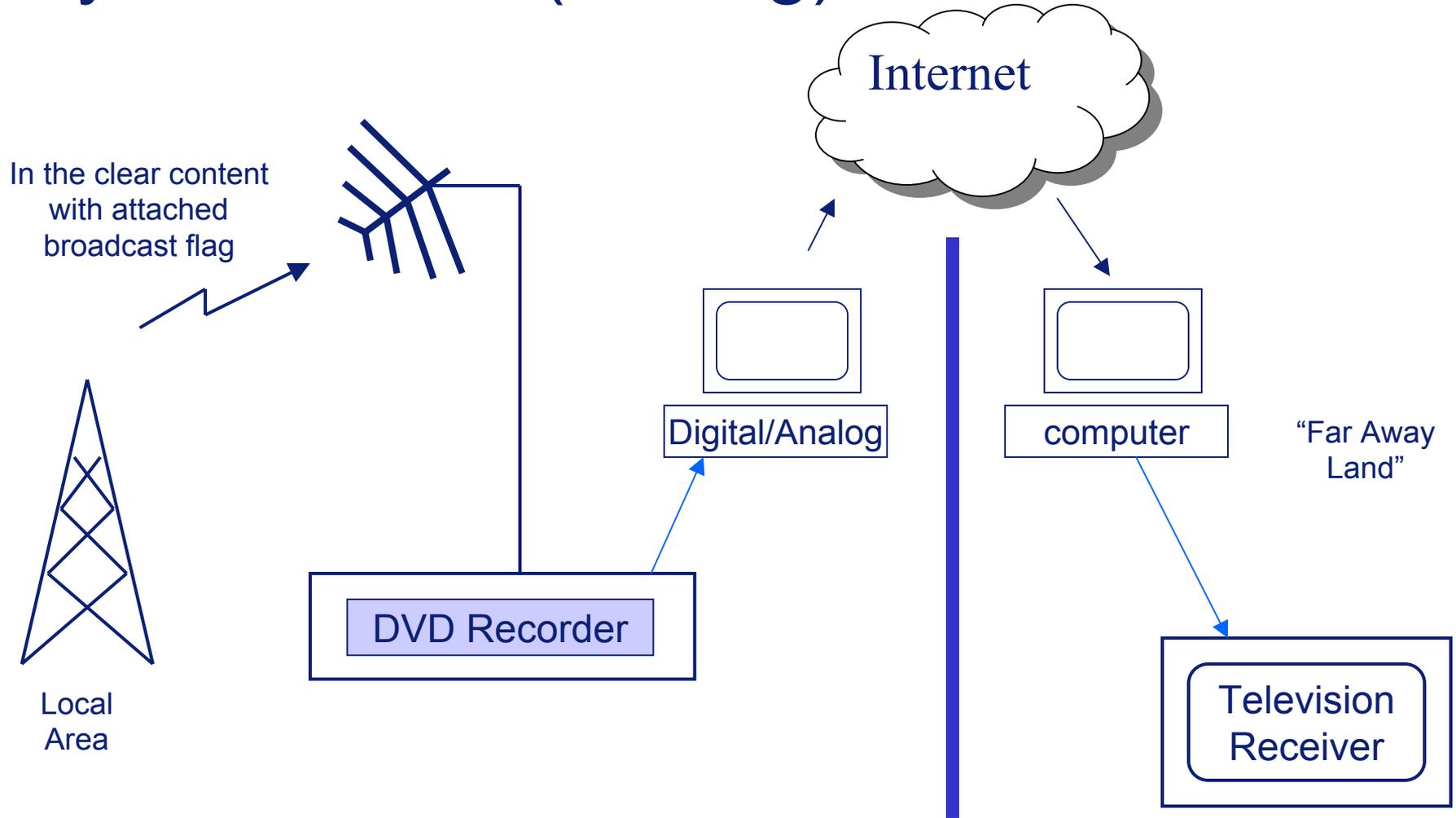
All devices must be compliant to receive, record and/or display protected content

Typical Consumer Network Will Include Multiple Legacy Devices For A Period of Time

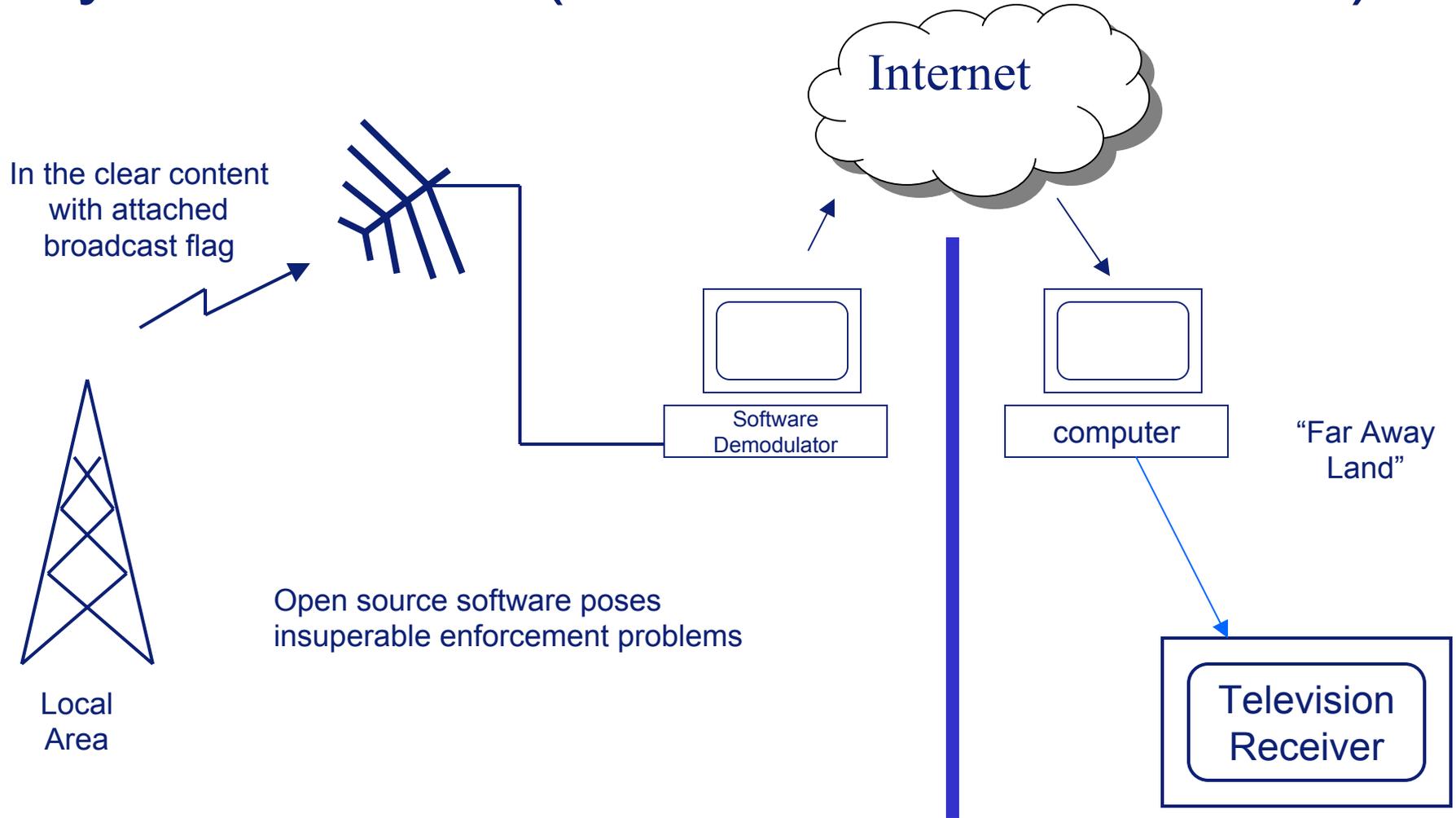


DTV content received and recorded on new (compliant) DVD recorder (and viewed on compliant DTV) in the family room cannot be viewed on legacy (non-compliant) DVD player in the bedroom, car or PC

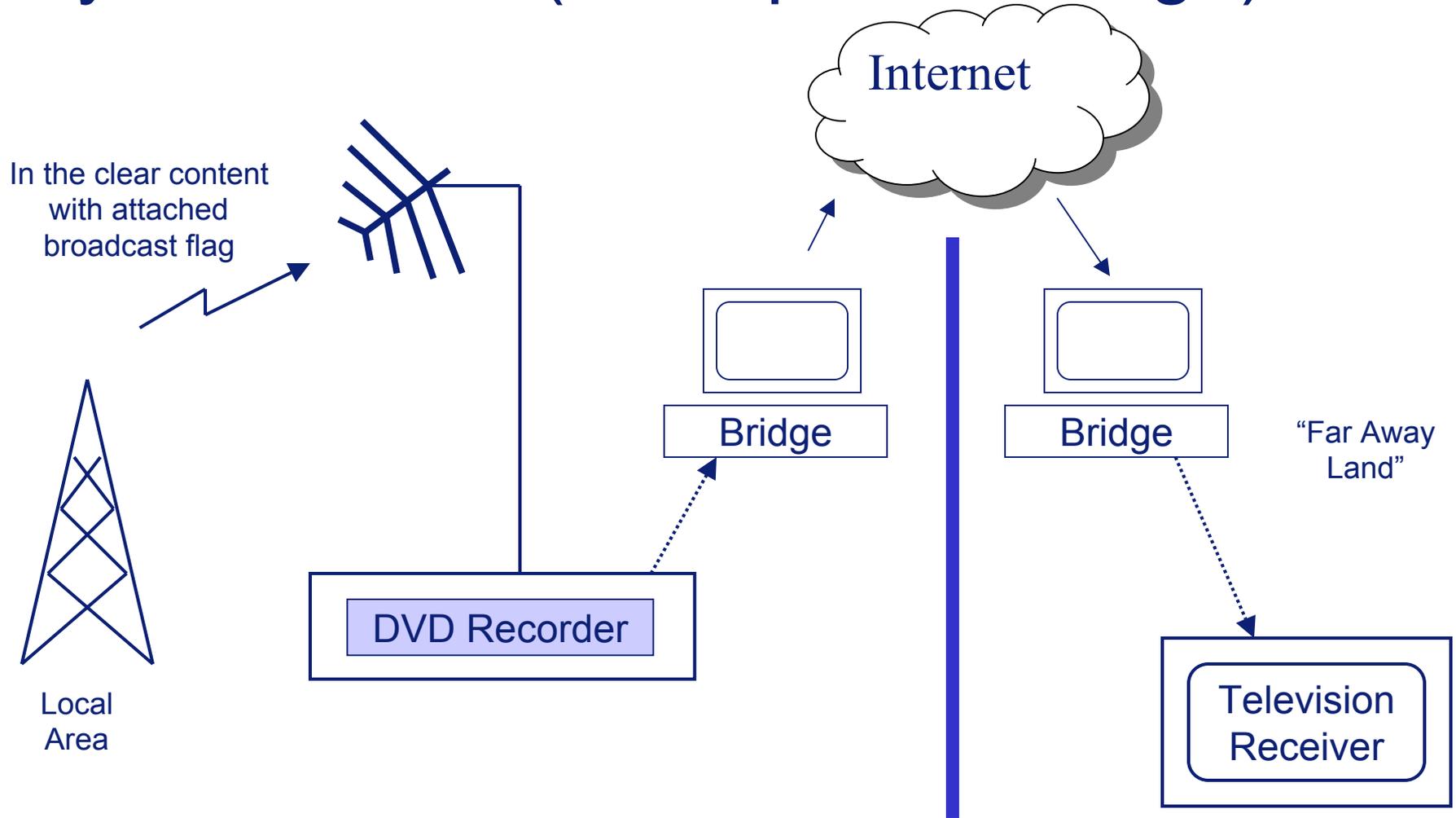
System Leaks (Analog)



System Leaks (Software Demodulator)



System Leaks (Transparent Bridge)



MPAA “Plug and Play” Comments

“However, because of the continued availability of unprotected analog connections permitted under this agreement, the agreement fails to achieve meaningful protection of digital content.”

Comments of the Motion Picture Association of America, Inc. *In the Matter of Compatibility Between Cable Systems and Consumer Electronics Equipment*, CS Docket No. 97-80, PP Docket No. 00-67, Notice of Proposed Rulemaking (rel. Jan. 10, 2003).

MPAA: A Sweeping Regulatory Regime

Device	Demodulator	Modulator*	Downstream Product**
Integrated DTV Sets	✓		✓
DTV Monitors			✓
Cable Set-Top Boxes	✓	✓	
Satellite Receiver	✓	✓	
Personal Video Recorders (e.g., TiVo, Replay)	✓	✓	✓
Advanced DVRs	✓	✓	✓
DVD Players		✓	✓
DVD Recorders	✓	✓	✓
D-VHS Recorders	✓	✓	✓
Computer with DTV Tuner Card	✓	✓	✓
Computer without DTV Tuner Card			✓
Network Routers & Switches			✓

* Devices identified ✓ in this category could include modulators and therefore be subject to FCC regulation.

** Devices identified ✓ in this category could be used as a “downstream product” within a consumer’s home network. For the consumer to utilize the device on that network and be able to access flagged digital broadcast content, however (*i.e.*, as opposed to its being a “stand-alone” device), the device would be required to utilize FCC-“authorized technologies,” or comply with the MPAA/5C’s FCC-adopted “Requirements.”

MPAA Selection Criteria for “Approved Technology” Are Not “Market-Based”

1. Approved by 3 major studios OR 2 major studios and 1 major TV broadcast group
 - Effectively a studio-designation mechanism, given that 3 of the 4 major TV networks are owned by a major studio
2. Approved by 2 major studios and licensed by 10 major device manufacturers
 - Studios still have decisive role over a technology even if licensed by 10 manufacturers

MPAA Selection Criteria (cont.)

3. At least as good as a previously selected technology
 - Still vulnerable to attack by the studios or major broadcast groups, followed by uncertain process with no clear criteria

MPAA Selection Criteria (cont.)

4. Listed as “permitted” under a license applicable to an already-approved technology
 - Gives gatekeeper control to licensors of previously-approved technology; potential to leverage control over competing technologies
 - ▶ MPAA criteria skew the playing field for new technologies strongly in favor of the major studios and/or the licensors of their anointed technology

Licensing: Competitive Concerns Arising Under 5C and 4C Licenses

- The right to change technologies and compliance and robustness rules without licensee input provides licensors with substantial competitive advantage
 - Advance notice of changes under consideration and first mover advantage in product and semiconductor markets
 - Ability to shape technologies and rules in favor of their products
 - Information about competitor plans when they seek changes

Licensing: Competitive Concerns (cont.)

- Licenses leverage control over DTCP and CPRM into unrelated businesses and technologies
 - CPRM licensee must agree to license applicable to both video and audio, and both CPPM and CPRM, even if licensee is not interested in audio or CPPM
- CPRM license unreasonably deprives licensees of IP rights
 - Required reciprocal non-assert extends beyond the license sought
 - *e.g.*, video and audio and CPRM and CPPM

Alternatives

- One Extreme: Encryption at the source
 - An end to free over the air broadcasting
 - Wholesale obsolescence of analog and digital TVs
- The Other Extreme: Business models simply adjust to the new environment
 - Inaction ultimately leads to content being made available by the content providers under updated business models
- Middle Ground: Watermarking
 - Alone or in concert with encryption

Watermarking: A Holistic Solution

- There is time, especially given the technical limitations on Internet redistribution of HDTV and SDTV content, to explore technologies that provide a holistic solution
- Substantial progress has been made on a DTV content protection system, based principally on watermarking, that avoids the anti-consumer, anti-competitive and anti-innovation effects of an encryption-based solution

Problem Statement

- Prevent the copying of “copy never” content
 - Pressed disks (purchased DVD)
 - Video on demand/Pay-per-view
- Prevent improper copying of “one generation” content
- Prevent the Internet re-transmission to the public of “broadcast content”
- Allow personal use when appropriate

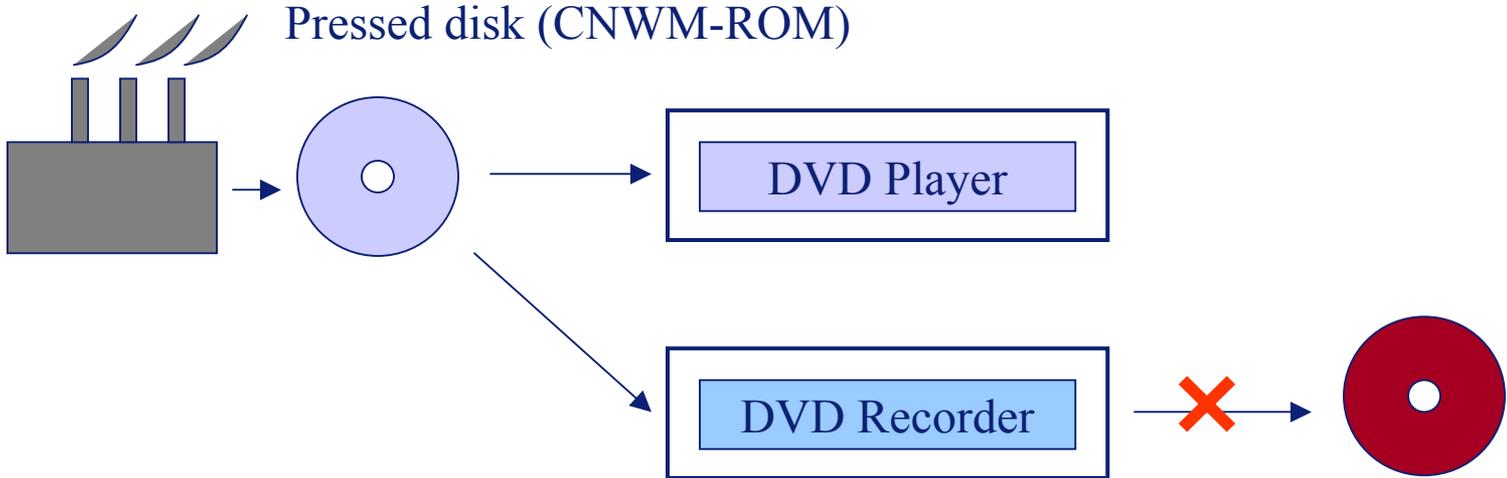
Watermark Description

- An indelible mark that carries information
- Does not interfere with the use of content
- Should be difficult to remove
 - Without destroying the content
- Should be difficult to write
- Should be inexpensive to find
 - If you know the secrets

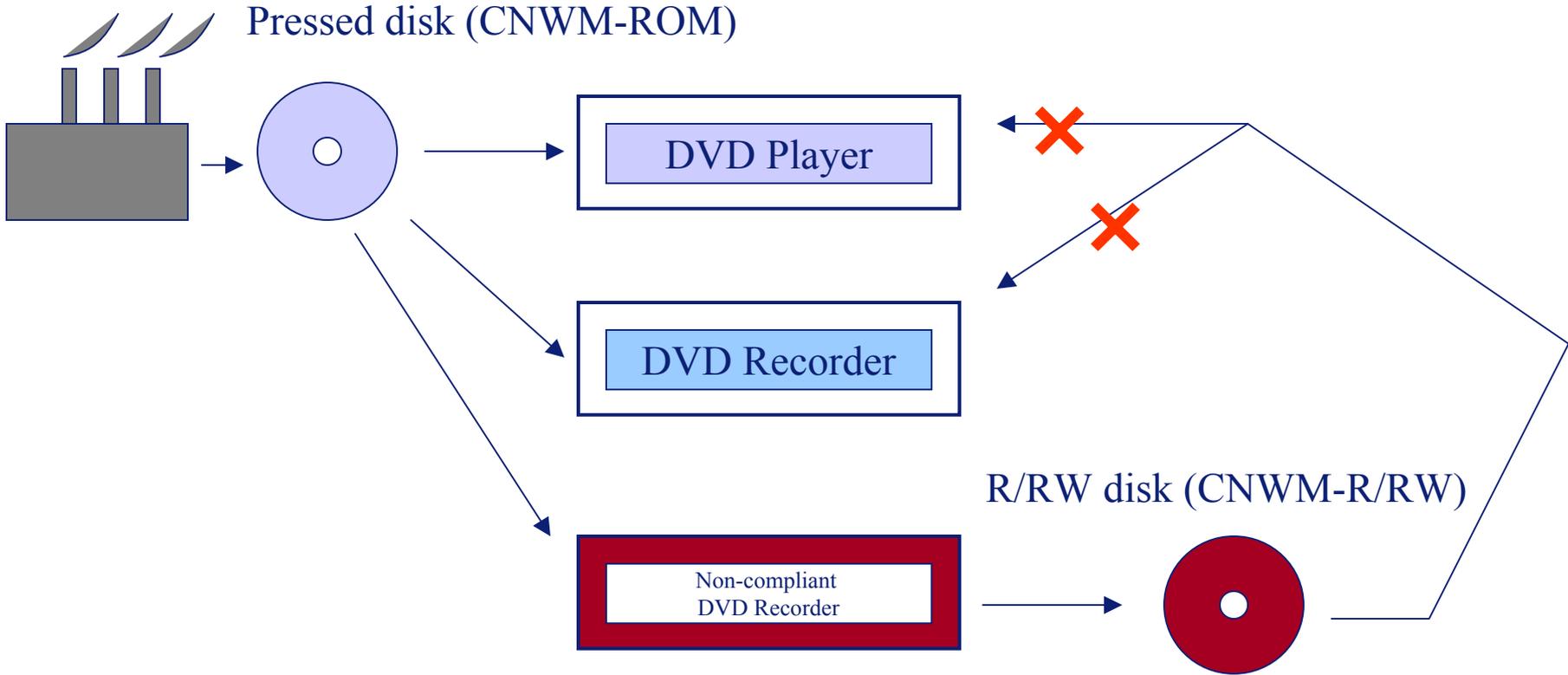
Watermark-States

- Watermark
 - Copy never
 - Copy one generation
 - Unlimited copies, do not transmit over the Internet to the public
- No watermark means no technical restrictions at all

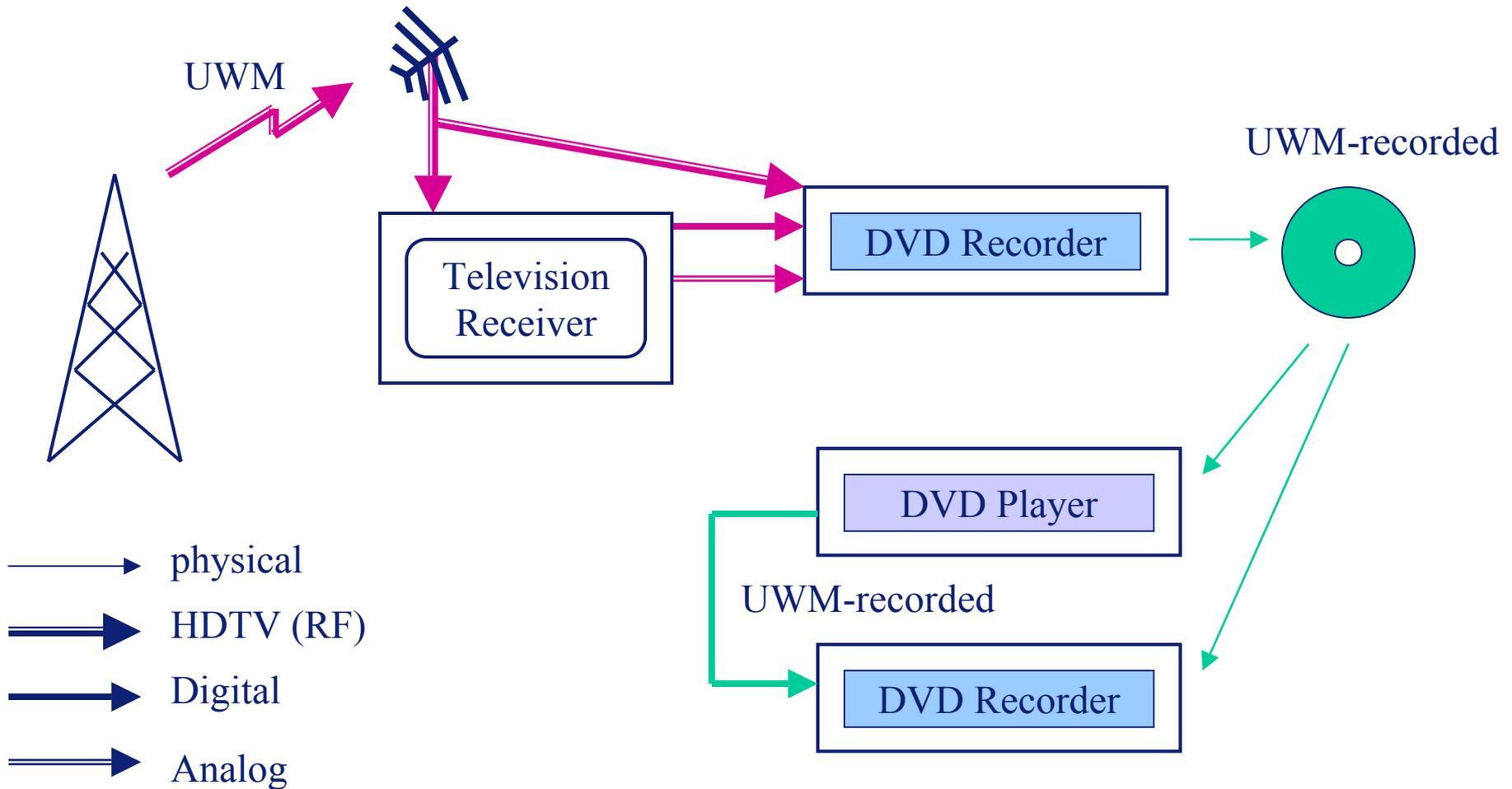
Copy Never Watermark System (Record Control)



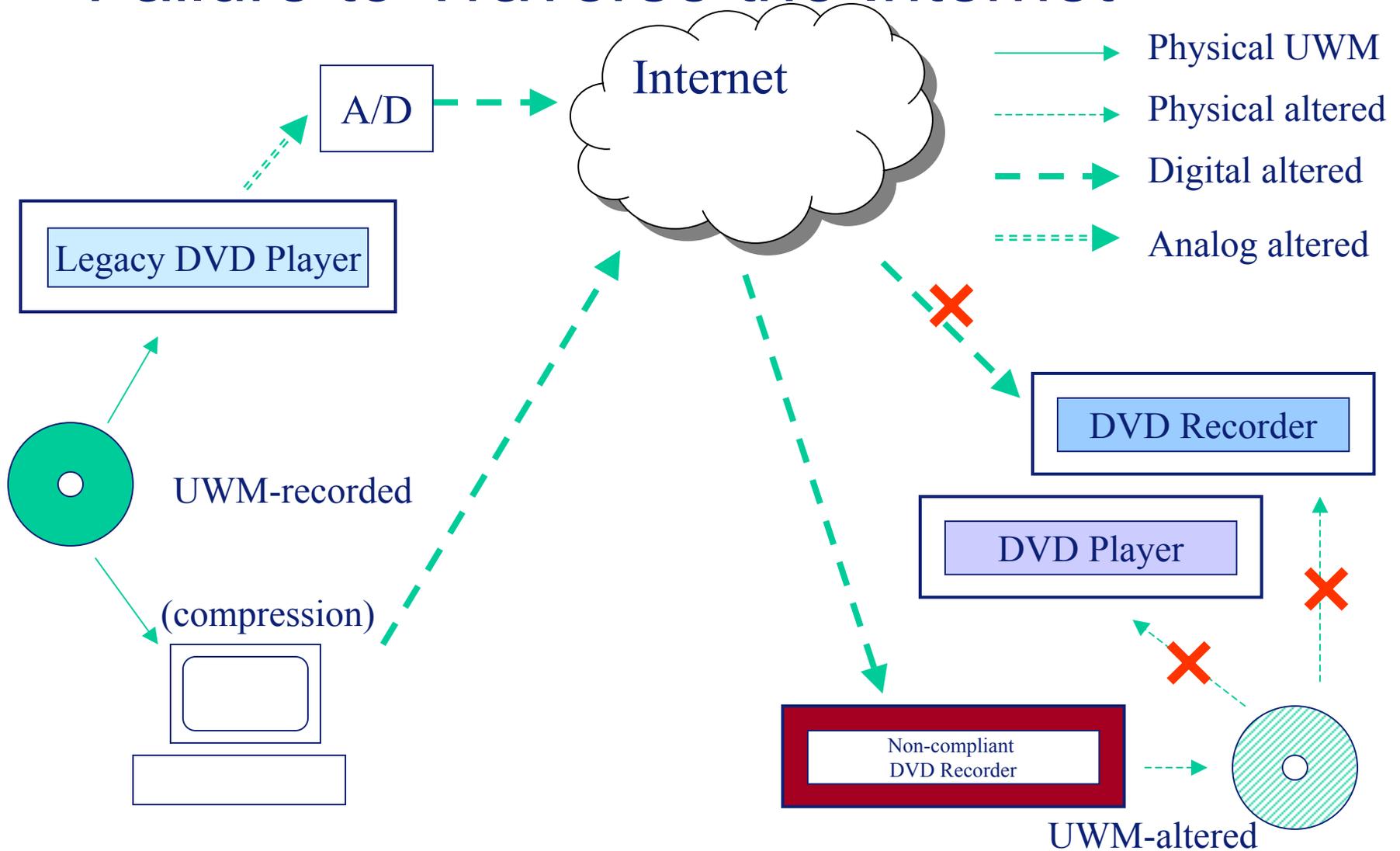
Copy Never Watermark System (Play Control)



Comprehensive System (1)

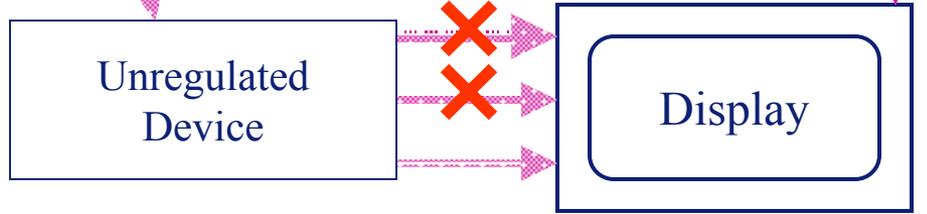
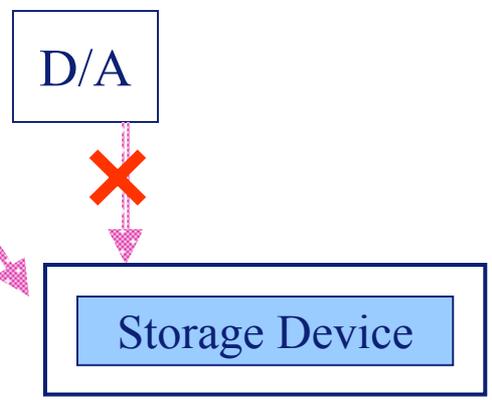
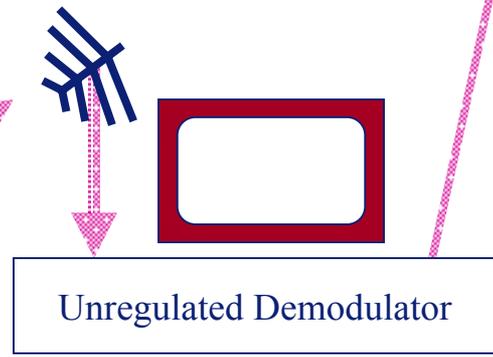
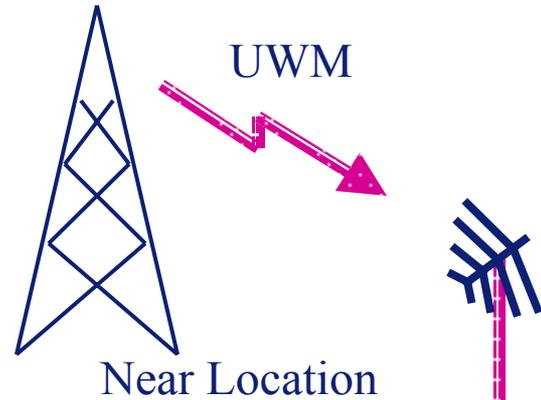


Failure to Traverse the Internet



Comprehensive System (2)

-  HDTV (RF) Remote
-  Digital Remote
-  Analog Remote
-  HDTV (RF) Near



FCC Jurisdiction to Adopt The Broadcast Flag

- Current law does not support FCC jurisdiction
 - Section 336 does not confer authority
 - Title I and Section 303(r) are insufficient to justify jurisdiction
- Specific grant of new statutory authority required

