CSS / DeCSS

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Outline

- *What is CSS?*
- *Original Intents of CSS*
- *Weaknesses of CSS*
- *What is DeCSS?*
- *Legal Issues*
- *Timeline*

What is CSS?

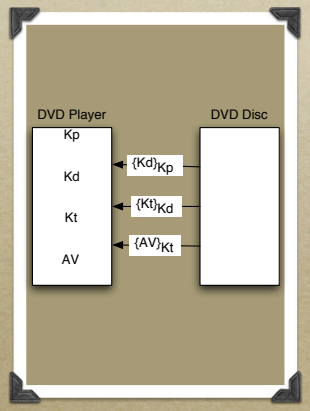
- *Content Scrambling System*
- *Used on DVD's*
- *Encrypts the Video and Audio Streams*

CSS

- *40-bit Encryption*
- *Each Licensed Player has its own key*
- *Each DVD knows 400 valid keys*

CSS

- *The Licensed Player key is used to decrypt a Disc Key*
- *The Disc Key will decrypt a Title Key*
- *The Title Key will decrypt the AV data for that title*



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Original Intents of CSS

- *Copy Protection*
- *Region Enforcing*
- *Non-Skippable FBI Warnings*

Other Consequences

- *Linux DVD Lockout*
- *Non-Skippable Advertisements*
- *What happens if someone moves from one DVD region to another region?*

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Weaknesses of CSS

- *Bit-wise Copies*
  - *Cheap DVD Burners (< $100)*
- *Only 40-bit encryption*
  - *Weak to brute-force*

CSS Weaknesses

- *Licensed DVD players must encrypt their player keys*
- *Multiple player keys reduce the key space*

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What is DeCSS?

- *A response to the above*
- *C Source Code to implement CSS decryption*
- *Originally intended for an Open Source Linux DVD player*

DeCSS

- *XingDVD failed to encrypt its player key*
- *Linux hackers reverse-engineered XingDVD and were able to retrieve a player key*
- *After one key was found, many more were discovered with brute force methods*

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Legal Issues

- *Legality of DeCSS*
- *Is DeCSS protected by the First Amendment as Free Speech?*
- *Fair Use and Copyright Issues*
- *7-9 GB per DVD - Where to store this data?*

Legal Issues

- *Lawsuits filed against authors and anyone linking to sites with DeCSS*
- *DeCSS Obfuscation and Mirroring*
- *Illegal Prime Numbers*

Illegal Prime Number

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4
8565078965 7397829309 8418946942 8613770744 2087351357
9240196520 7366869851 3401047237 4469687974 3992611751
0973777701 0274475280 4905883138 4037549709 9879096539
5522701171 2157025974 6669932402 2683459661 9606034851
7424977358 4685188556 7457025712 5474999648 2194184655
7100841190 8625971694 7970799152 0048667099 7592359606
1320725973 7979936188 6063169144 7358830024 5336972781
8139147979 5551339994 9394882899 8469178361 0018259789
0103160196 1835034344 8956870538 4520853804 5842415654
8248893338 0474758711 2833959896 8522325446 0840897111
9771276941 2079586244 0547161321 0050064598 2017696177
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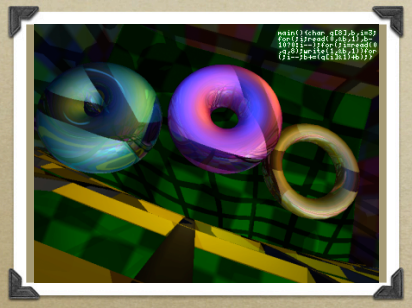
Steganography



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Timeline

- *September 1996 - DVD Format Specification*
- *1997-1998 - Growth of DVD Market*
- *1998 - Methods to Copy DVDs put to use*
- *October/November 1999 - DeCSS announced on LiViD mailing list*

Timeline

- *December 1999 - MPAA Seeks Temporary Restraint Order*
- *January 2000 - Trial Begins*
- *July 2000 - Ruling in Favor of MPAA*
- *November 2003 - Author of DeCSS creates tool to remove DRM from AAC files*

References

- *http://www-2.cs.cmu.edu/~dst/DeCSS/Gallery/plain-english.html*
- *http://www.wired.com/news/technology/0,1282,32263,00.html*
- *http://en.wikipedia.org/wiki/DeCSS*
- *http://www.cs.nmsu.edu/~joshagam/css/*
- *http://www.opendvd.org/*