

# Information Tracking

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# Outline

- Motivation
- Types of Information Tracking
- An Example
- Steps of Object Tracking
- P2P (eDonkey) Network Tracking
  - System Framework
  - System Capabilities
  - System Criteria
- Conclusion and Future work
- Reference

# Motivation

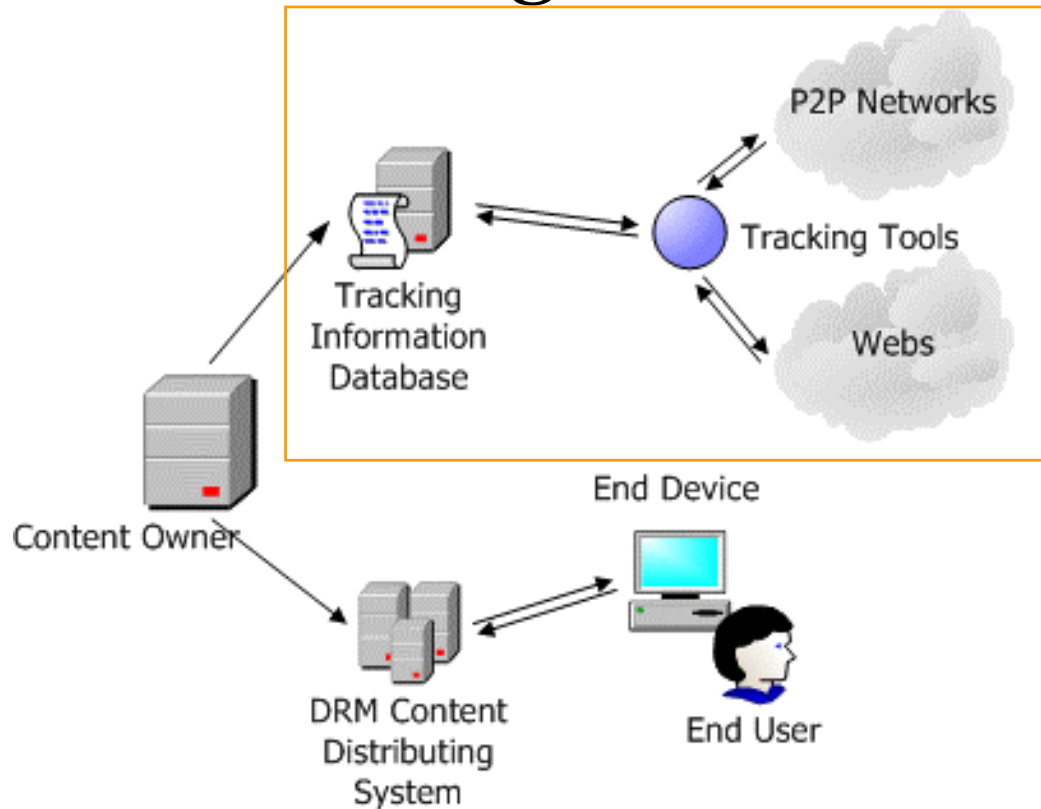
- In Digital Rights Management system, it is important to manage the access rights of digital content (objects), not only to define the user right on the objects but also to assure that any user would not exceed his privilege.
- Information tracking tools may be useful for finding the legal or illegal operations and redistribution of protected objects.

# Types of Information Tracking

- Operations tracking
- Redistribution tracking
  - Off-line tracking
  - On-line tracking
    - Web tracking
      - It may use filename, type, and size to collect the potential objects from webs.
    - Packet filter
      - We may put a tool on ISP's gateway to catch characteristic packets of the protected content.
    - Peer to peer file sharing network tracking
      - It is possible to use file hash value to find out and identify a file in P2P network which supports file search via hash.

# An Example

- The Role of Tracking Tools



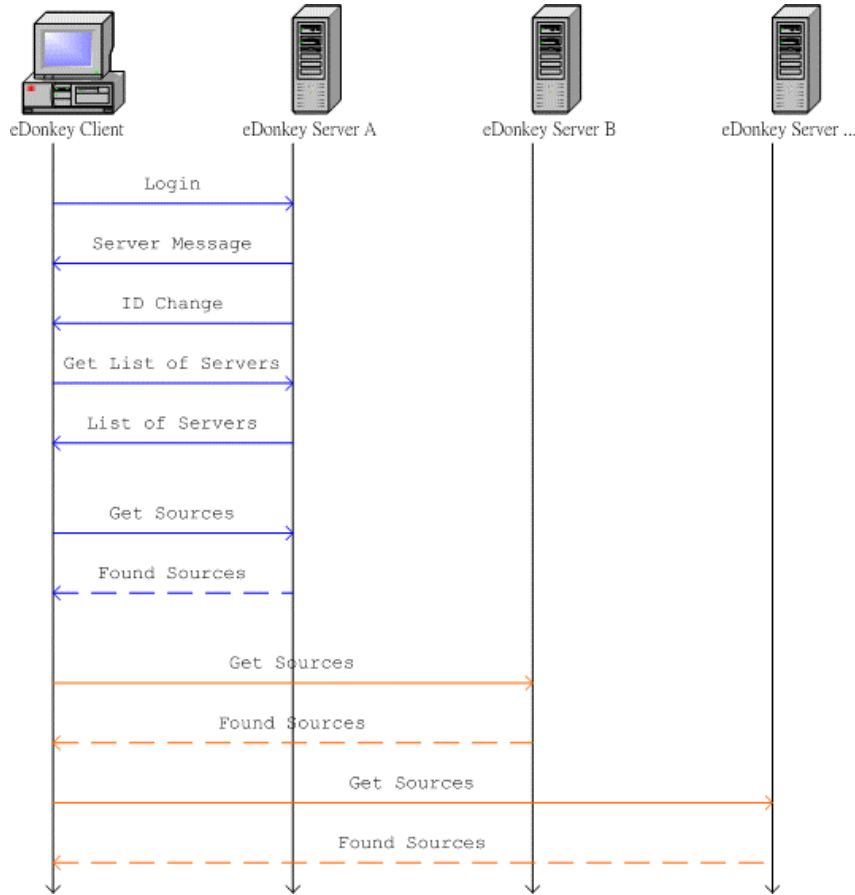
# Steps of Object Tracking

- Candidates generation
  - By keywords;
  - By object type;
  - By object size;
  - By object character.
- Object verification
  - Content feature;
  - Unique characteristic feature.
  - Partial matching;
  - Exact matching.

# P2P (eDonkey) Network Tracking

- The eDonkey file sharing network:
  - There are still servers performing centralized indexing services, such as file search functions.
  - It supports two kinds of file search methods: keyword search and file ID (hash) search.
  - We use client-server communication to gather server list and to search the protected content via file ID search.

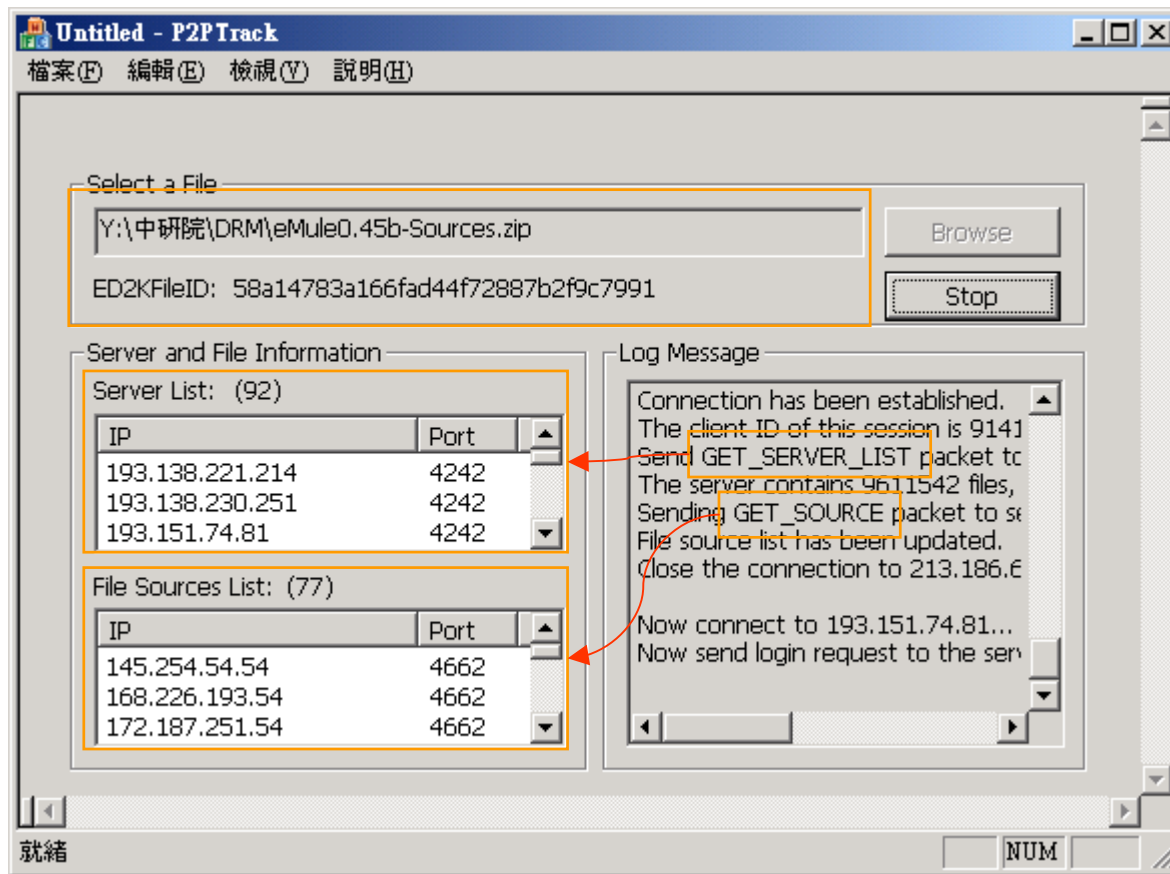
# eDonkey Network Tracking



- System framework
  - The client first logs in to server A, and gets list of servers.
  - The client then sends **Get Sources** packets containing file ID to all the servers in the list.
  - If a server finds the source in its indexing database, it then returns the **Found Sources** packet containing the list of sources back to the client.



# eDonkey Network Tracking



# eDonkey Network Tracking

- System capabilities
  - It needs not to download the whole file content but only the 16-byte file hash value to identify a object.
  - Within the identical method, we can find out and identify if someone redistributed or held the target object.
  - The result would not be affected if someone changes the filename of the target object.

# eDonkey Network Tracking

- System criteria
  - Although it resists the modification of filename, it still cannot deal with the modification of object content.
  - The system depends on the number of available servers a lot.

# Conclusion and Future Work

- Information tracking is an element in Digital Right Management.
- The goal of information tracking is not to prevent content from being copied, but to provide evidence for illegally redistributing or owning objects.
- The popular eDonkey network provides a convenient environment for information tracking implementation.

# Conclusion and Future Work

- Further analysis of the gathered information.
- Other popular P2P network protocols should be included.
- Web tracking might be considered.

# Conclusion and Future Work

- How to know who illegally redistributes the file?
  - Fingerprint information;
  - Fingerprint + encryption + decryption;
  - Fingerprint + encryption + file hash.
- Is it deserved and applicable to NDAP?
  - There might be a lot of effort to gain little information.

# Reference

- eMule project.

<http://www.emule-project.net>