**SERAT: SEcure Role mApping Technique for decentralized secure interoperability**

**Mohamed Shehab**

- **Secure Interoperability**
  - Given $n$ secure systems, $G=<V, A>$, $i=1,...,n$, the interoperability between these systems is achieved by introducing:
    - Cross domain arcs, $F$.
    - Restricted access set, $R$.
  - How to satisfy the interoperability principles of autonomy and security.

- **Issues with the MSI Solution**

**Elisa Bertino**

- **Secure Interoperability**
  - Principle of autonomy, requires that any access permitted within an individual domain must also be permitted under secure interoperation.
  - Principle of security, requires that any access not permitted within an individual domain must also be denied under secure interoperation.

- **Path Linking Rules**
  - Introduce an access path, which describes the user’s role accesses in the visited domains.
  - Introduce path linking rules
  - Introduce additional path constraints
  - Introduce path protection and authentication
  - Introduce path discovery

**Arif Ghafoor**

- **The Maximal Secure Interoperability (MSI)**
  - "For any positive integer $K|F|$, determine whether a secure solution $S$ exists such that $S \subseteq F$ and $|S| \geq K$.

- **Issues with the MSI solution**
  - NP-Completeness
  - Centralized Algorithm
  - Static Solution
  - Not Fair Solution

- **SERAT system architecture**

- **Additional Path Constraints**
  - Separation of Duty (SoD) Constraints
  - Bound on Number of Domains
  - Path Ordering Constraints

- **Decentralized Secure Interoperation**

- **Path Linking Rules**
  - Strict linking rules:
    - The strict path linking rules do not allow the presence of null cross links.
  - Flexible linking rules:
    - These rules allow null cross links to exist and are used as a methodology for open interoperation.

- **Path Protection and Authentication**

- **On-demand Path Discovery**
  - Neighborhood Maintenance
    - Hello messages to neighbors.
  - Path Querying
  - Path Selection

**Notes:**
- Path Querying
- Introduce path linking rules
- Introduce additional path constraints
- Introduce path protection and authentication
- Introduce path discovery

**References:**
- [SERAT system architecture](image)
- [Path Protection and Authentication](image)
- [On-demand Path Discovery](image)