IODEF extension for Reporting Cyber-Physical System Incidents

draft-murillo-mile-cps-00

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Why an extension is needed

- There does not exist a global, machine friendly approach for reporting incidents that happen in physical systems that are controlled by software and hardware systems (nuclear reactor, electric grid, rail transportation systems, etc)

- These systems are gradually becoming more interconnected; legacy systems do not have proper cybersecurity protection; the exists highly-skilled individuals and motivations; some these systems are generally considered critical; attacks to CPS systems are a natural extension of IT cyber-attacks; the emergence of the Internet of Things (IOT); and these attacks can be carried out remotely and quite inexpensively

- IETF is a leading global standards organization whose work in the field would benefit an area that needs urgent attention.

Cyber-Physical Systems

Cyber-Physical Systems are computer- or microprocessor- or microcontroller-based systems that monitor and control physical processes .

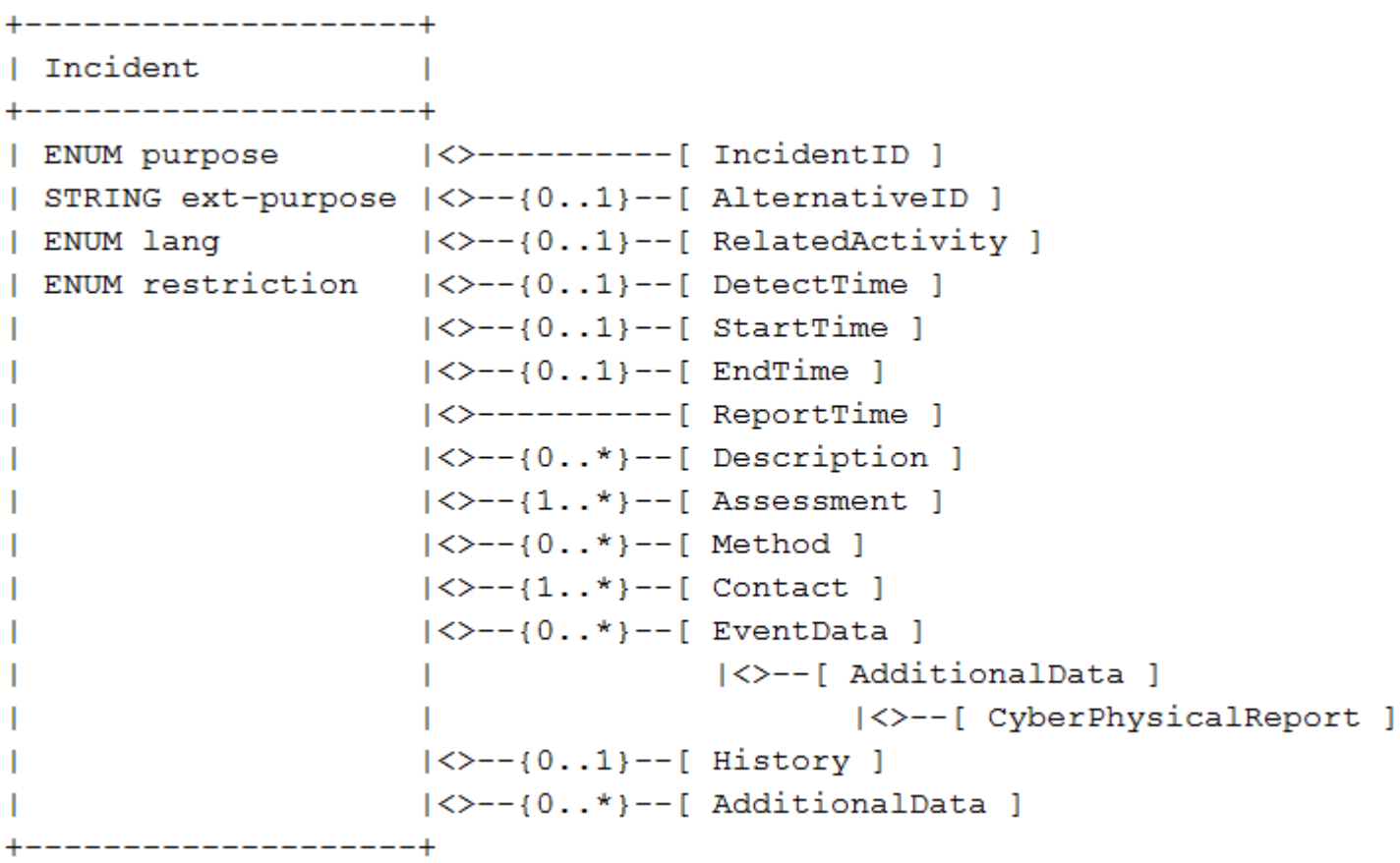
Example: Open/close reservoir locks, control rail system track system, control temperature/pressure in nuclear facilities, control flow of oil through pipelines, balance the distribution of electricity in (international) electric grids, etc.

Generic CPS system

Cyber-physical system incident

- IT system misbehavior
- Physical system misbehavior due to and IT system compromise
- Misbehavior of a physical system as noticed at the physical infrastructure level: explosion, flooding, pressure loss, and others
- Misconfiguration or degradation of control system performance, as noticed by an operator.
- The disruption of control systems operation due to the blocking of the flow of information through corporate or control networks
- Illegal or unauthorized changes made to alarm threshold levels, unauthorized commands issued to control equipment
- False information sent to control system operators or to corporate HQ
- The modification of control system software or configuration settings, producing unpredictable results
- Malicious software (e.g., virus, worm, Trojan horse) introduced into the system
- Recipes (i.e., the materials and directions for creating a product) or work instructions modified in order to bring about damage to products, equipment, or personnel

CyberPhysicalReport Report XML



The CyberPhysicalReport Element

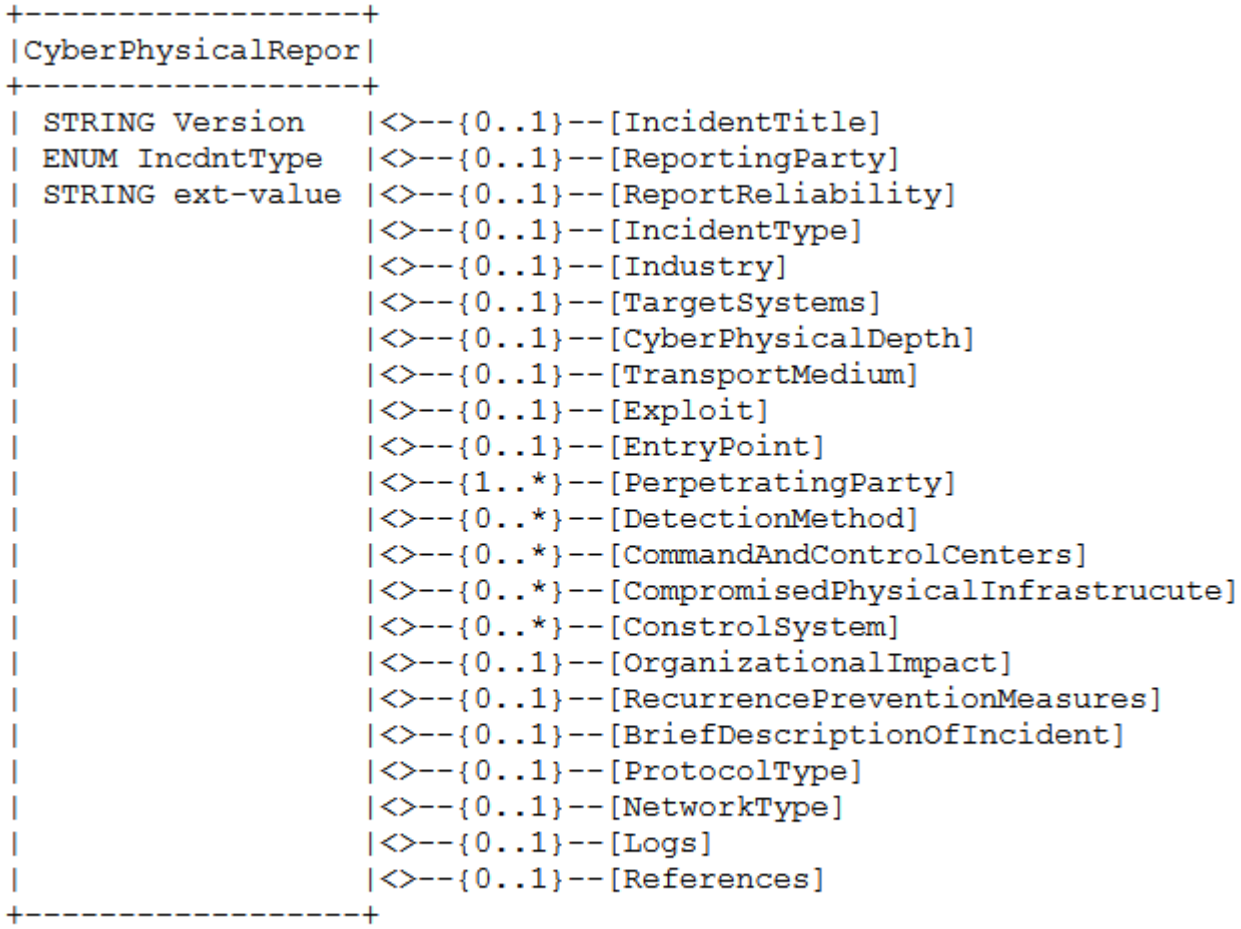


Figure 3: The CyberPhysicalReport Element

Further work in the extension

- **An XML Schema for the Extension**
- **An Example XML**
- **Case studies applied to different types of infrastructures/scenarios**
- **Revision of the CyberPhysicalReport Element/XML**
- **Others as needed**