World Class Standards

Standardization of monitoring protocols for energy systems (ES 202 336)

Ir. Jean-Philippe Vanhulst
ETSI EE Member
Cherokee International

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Introduction

- Technical overview of new ETSI standard:
  - Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling, and Building Environment Systems used in Telecommunication Networks) : ETSI ES 202 336
  - Chairman EE2: Didier Marquet (FT)
- Nowadays, multiple standards:
  - Dry alarms
  - Proprietary protocols
  - SNMP
  - X25
  - Etc.
- Operators asking for ALL-IP management solutions

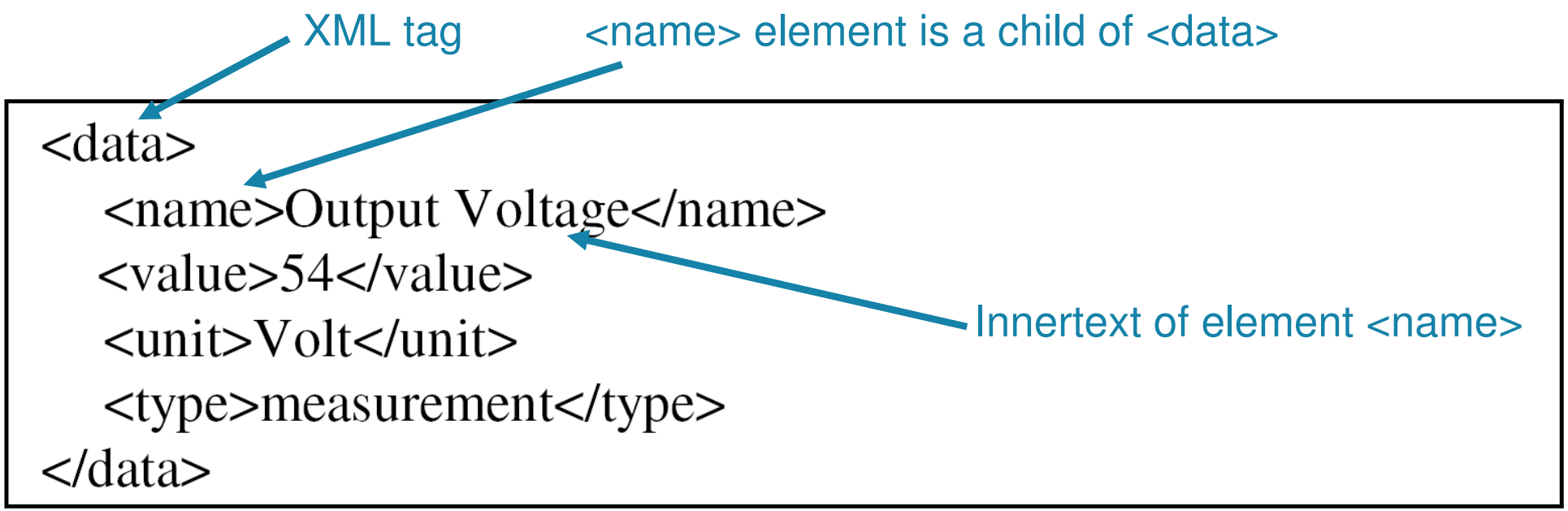
Agenda

- (Introduction)
- Interoperability relays on communication protocols
- Quick XML Overview
- XML data structure in ES 202 336 standard
- Exchanging XML data
- Bandwidth usage
- Conclusions

Interoperability relays on communication protocols

- Key factor for fast deployment of network infrastructure
- Proprietary protocol : not a good choice !
- Why not SNMP ?
  - UDP is an unreliable transport protocol
  - No guarantee of alarm delivery (Trap)
  - Management Information Base (MIB) not very flexible
  - Difficult to evolve
  - MIBs of multiple vendors never compatible together
  - Not very secure (except SNMP V3 but not really used)
- → ETSI EE/EE2 committee decided to use XML over TCP/IP
  - Reliable
  - Flexible
  - Compatible because the XML structure can standardized

Quick XML Overview

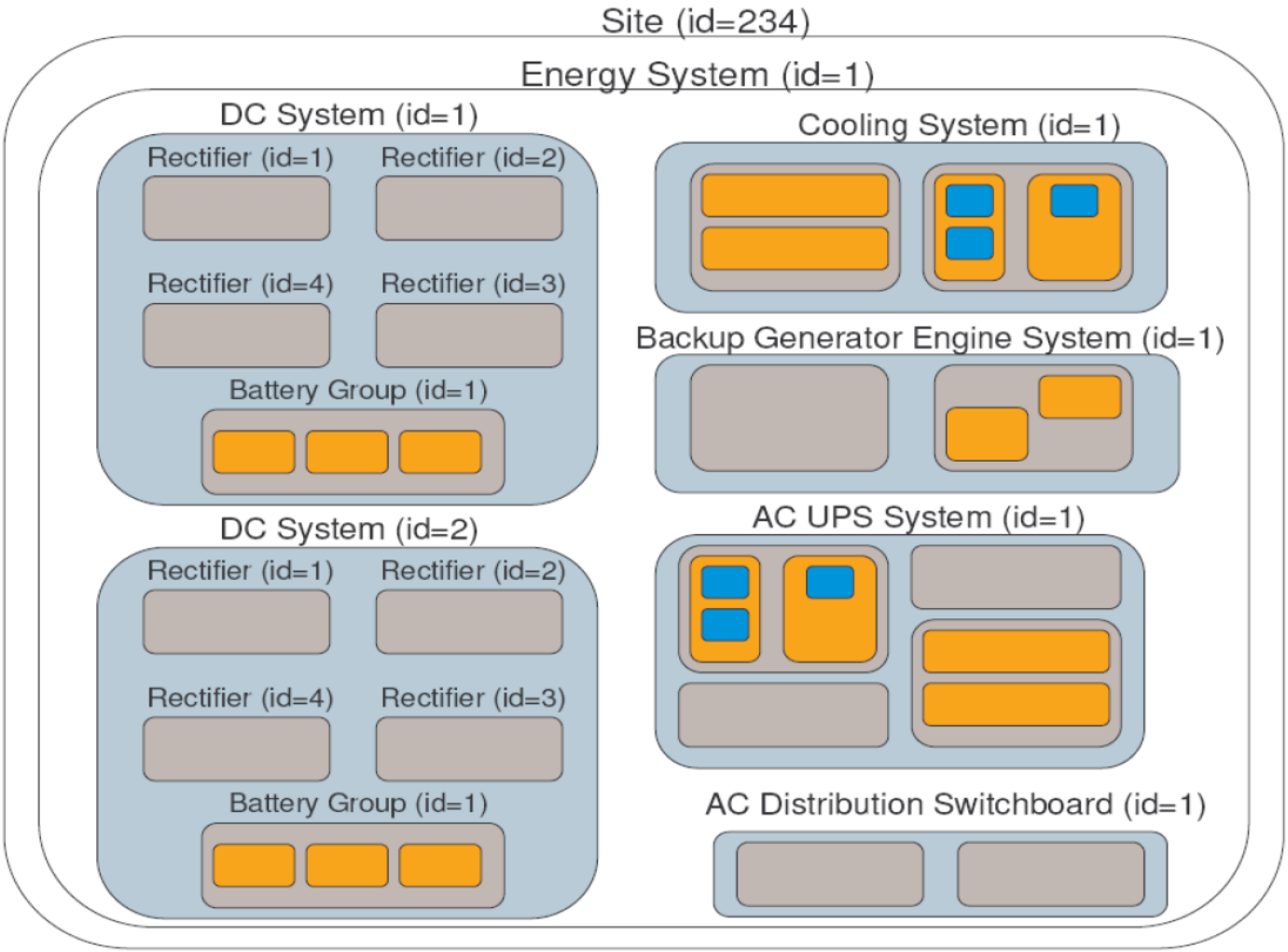


For information about the data : using attributes in name/value pair

```
<data name=”Output Voltage” type=”measurement”
”unit=”Volt”>54</data>
```

XML data structure in ES 202 336 standard

- The concept of hierarchy



XML data structure in ES 202 336 standard

- Structure of XML document really free → Definition of some rules

- The standard defines multiple attributes, some are mandatory
  - status : normal, alarms, unknown
  - id : an identification number
  - severity_type : information, warning, minor, major, critical

- The standard defines child nodes for any equipment or system
  - <description_table>
  - <alarm_table>
  - <event_table>
  - <data_table>
  - <data_record_table>
  - <config_table>
  - <control_table>

XML data structure in ES 202 336 standard

- Example for <an_equipment>

```
<an_equipment>
   <description_table>
      …
   </description_table>
   <alarm_table>
      …
   </alarm_table>
   <event_table>
      …
   </event_table>
   <data_table>
      …
   </data_table>
   <data_record_table>
      …
   </data_record_table>
   <configuration_table>
      …
   </configuration_table>
   <control_table>
      …
   </control_table>

   … sub equiments …

</an_equipment>
```

XML data structure in ES 202 336 standard

- <description> elements in <description_table>

```
<description_table>
    <description id=”4” name =”Serial Number”
    group=”Manufacturer”>45623-5F-EG</description>
    …
    <description id=”7” name =”Max Output Power”
    group=”Manufacturer”  subgroup=”Specifications”
    unit=”watt”>850</description>
</description_table>
```

XML data structure in ES 202 336 standard

- <alarm> elements in <alarm_table>

```
<alarm_table>
    <alarm id="1" active="false" name="DC bus Low"
    severity_type="major" severity_level="5"/>
    ...
    <alarm id="3" active="true" name ="Mains Fail"
    severity_type="major" severity_level="5" start_time="2006-12-
    17T18:23:12Z"/>
</alarm_table>
```

XML data structure in ES 202 336 standard

- <event> elements in <event_table>

```
<event_table>
    <event id="1" type="information"  datetime="2006-12-
    17T18:23:12Z">Equipment started</event>

    <event id="2" type="alarm_start" severity_type="major"
    severity_level="5" alarm_id="2" datetime="2006-12-
    17T19:25:12Z">Alarm appeared: Mains fail</event>

    <event id="3" type="alarm_stop" severity_type="major"
    severity_level="5" alarm_id="2" datetime="2006-12-
    17T20:25:12Z">Alarm disappeared: Mains fail</event>
</event_table>
```

XML data structure in ES 202 336 standard

- <data> elements in <data_table>

```
<data_table>
    <data id="1" name="Output Voltage" type="measurement"
unit="volt" accuracy="1%" format="xs:decimal" datetime="2006-12-
    17T18:23:12Z"     name_FR="Tension de sortie">54</data>
</data_table>
```

XML data structure in ES 202 336 standard

- <config> elements in <config_table>

```
<dc_system id="1" status="normal">
 + <description_table></description_table>
 + <alarm_table></alarm_table>
   <event_table/>
 + <data_table></data_table>
 − <config_table>
      <config id="1" name="DC Bus Float Voltage at 25 degC" group="Bus Voltage" unit="V">54.00</config>
      <config id="2" name="DC Bus Voltage Low 1" group="Bus Voltage" unit="V">48.00</config>
      <config id="3" name="DC Bus Voltage Low 2" group="Bus Voltage" unit="V">43.20</config>
      <config id="4" name="Battery Capacity" group="Battery" unit="Ah">30</config>
      <config id="5" name="Max Charging Current" group="Battery" unit="A">3.00</config>
      <config id="6" name="Battery Temperature Low" group="Battery" unit="Celcius Degree">-10.00</config>
      <config id="7" name="Battery Temperature High" group="Battery" unit="Celcius Degree">50.00</config>
      <config id="8" name="Open LVD Under Vbus Low2" group="Battery">True</config>
   </config_table>
 + <rectifier id="1" status="normal"></rectifier>
```

XML data structure in ES 202 336 standard

- <control> elements in <control_table>

```
    </config_table>
  - <control_table>
        <control id="1" name="Start Battery Test"/>
        <control id="2" name="Back To Float"/>
    </control_table>
  - <rectifier id="1" status="normal">
```

XML data structure in ES 202 336 standard

- Example for a site:

```
<site id="1" status="normal" datetime="2007-09-25T15:08:34" xsi:noNamespaceSchemaLocation="ETSI_part01_site.xsd">
 + <description_table></description_table>
   <alarm_table/>
 + <event_table></event_table>
 + <data_table></data_table>
 + <config_table></config_table>
 − <energy_system id="1" status="normal">
    − <dc_system id="1" status="normal">
       + <description_table></description_table>
       + <alarm_table></alarm_table>
         <event_table/>
       + <data_table></data_table>
       + <config_table></config_table>
       + <rectifier id="1" status="normal"></rectifier>
       + <rectifier id="2" status="normal"></rectifier>
       + <rectifier id="3" status="normal"></rectifier>
       + <rectifier id="4" status="normal"></rectifier>
      </dc_system>
   </energy_system>
</site>
```

Exchanging XML data, with open protocols

- Retrieving XML document with HTTP get
  - Each monitoring acts as a Web Server
  - Holds one or more XML documents
  - ex: http://10.23.45.98/site.xml
  - Some parameters can be passed:
  - http://the_site_ip/site.xml?description_table=false&level=3

Exchanging XML data, with open protocols

- Web services like SOAP
  - Standardized by the World Wide Web Consortium (W3C)
  - Most flexible way to exchange data
  - Over HTTP
    - No problems with firewall, corporate networks, extranets
    - No security issues: VPN, https, flexible login-password credentials
  - Used to call functions over HTTP:
    - SetValue(xml value path, new value)
    - GetValue(xml value path)

Bandwidth usage

- Higher than for SNMP ? Only true in the absolute
- SNMP requires continuous polling (not reliable)
- XML over TCP/IP is reliable. A communication is established only if necessary

- To retrieve many data about a site, SNMP needs many request-response.
- With XML over TCP/IP, with only one HTTP GET request, you can retrieve everything.

Conclusions

- The use of XML over TCP/IP for site and system monitoring has many advantages
- During next months, vendors will certainly integrate XML according to ETSI recommandations
- It will ease the compatibility between multiple vendors
- For the time beeing: only core part and dc system part are almost finished
- If you want to help, please join ETSI EE2

Thank you for your attention

Ir. Vanhulst Jean-Philippe
Cherokee International
ETSI EE Member

jp.vanhulst@cherokee.be

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