IEEE P1722.1 Control/Mixer/Matrix Descriptors

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Introduction

- The generic control, mixer and matrix share common definition of parameter values and parameter value specifications
- Define these separately from generic control
- In the details of the definitions there is a lot of regularity, that makes it easier to understand the definitions by building them up from basic data types to complete definitions
Data types

- Data types are common to (at least) Control, Mixer, Matrix descriptors. They appear both in the descriptors, and in the GET/SET PDUs for the described objects.
- So define separately from the Control descriptor
  - Basic numeric types INT8, UINT8, INT16, UINT16, INT32, UINT32, INT64, UINT64, FLOAT, DOUBLE
  - Non-numeric: UTF-8, SAMPLERATE?, DESCRIPTOR_ID, STRING_INDEX
  - Structured: BODE_PLOT_POINT, GPTP_TIME, SMPTE_TIME
Valid values specifications

- Two main ways to define the valid values for a single element.
  1. LINEAR: \([\text{min}, \text{max}, \text{step}]\) applies to numeric types
  2. ENUMERATED : \((\text{count}, [\text{value}, \text{value},...])\)

(Other ways to define validity are implicit, or a special way determined by the type)
Value Specification Applicability

- Two ways of applying a validity specification to an array of values.
- COMMON : One spec applies to all elements
- ARRAY : An array of specifications, 1:1 with values.
Parameter Value Specs.

- Combine data type, validity spec, applicability to get overall details type, for example

- COMMON_LINEAR_UINT8

- ARRAY_LINEAR_UINT8

- COMMON_ENUMERATED_SAMPLERATE

- ARRAY_ENUMERATED_TYPE possible, but not currently supported. Limited usefulness because of PDU size limit?
Value spec common fields

- The numeric specs (LINEAR, ENUMERATED) share common fields: units, default_value, string, so use a common layout
  - Units (16 bit units)
  - String (16 bit string index)
  - default_value (W * 8 bits)
  - (min,max,step) or (count, (val,val,...))
Spec doesn't need Current value

- Current parameter value specifications include current_value
- However, the current_value is always (?) invalid for Mixer and Matrix, and for Control when unknown_value flag is set.
- The protocol must still work with the current_value removed from the specs, so start from this, and then allow current_value to be appended as an optimization.
Separate value spec from values

<table>
<thead>
<tr>
<th>Offset (octets)</th>
<th>Length (octets)</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>D</td>
<td>Many fields</td>
<td>Depending on descriptor type</td>
</tr>
<tr>
<td>0.125</td>
<td>R (1 bit field)</td>
<td></td>
<td>Flag; 1: read-only, 0: read/write</td>
</tr>
<tr>
<td>0.125</td>
<td>U (1 bit field)</td>
<td></td>
<td>Flag; 1: value not present, 0: value present</td>
</tr>
<tr>
<td>1.75</td>
<td>parameter_details_type (14 bit field)</td>
<td></td>
<td>Determines layout of parameter_value_details and parameter_values</td>
</tr>
<tr>
<td>2</td>
<td>number_of_values</td>
<td></td>
<td>Number of elements in parameter_values_array</td>
</tr>
<tr>
<td>X</td>
<td>P</td>
<td>parameter_details</td>
<td>Parameter value specification (See section #.#)</td>
</tr>
<tr>
<td>X+P</td>
<td>V</td>
<td>parameter_values</td>
<td>Parameter current values. Only present if unknown_value flag==0</td>
</tr>
</tbody>
</table>
Benefits

- Clear separation of value metadata from values
- Simple device can use static descriptors (current values always retrieved separately)
- Maximum value count is increased slightly (omitting current values leaves more room for specs)
- Small mixer and matrix can include current values
- Layout of Control current values part is shared between descriptor and GET/SET PDU
- Avoidance of conditional language e.g. “The values field only conveys the current value and not the max, min, default and step”
Minor points

- Is there a better name for BODE_PLOT? Each array element is a tuple of (magnitude, phase, frequency). Call these what? Phasor? Fourier_component? ???. The array of values is a ? Frequency_response?

- It is possible to specify some metadata about UTF-8 values: maximum_octet_count, maximum_characters