Open Source ASN.1 Compiler
asn1c quick start sheet

The ASN.1 compiler is a tool for creating data encoders and decoders out of formal ASN.1 specifications. An ASN.1 abstract syntax may look like this:

```
TestModule DEFINITIONS ::= BEGIN        -- Module parameters preamble
    Circle ::= SEQUENCE {               -- Definition of Circle type
      position-x INTEGER,               -- Integer position
      position-y INTEGER,               -- Position along Y-axis
      radius     INTEGER (0..MAX)       -- Positive radius
    }                                   -- End of Circle type
END                                     -- End of TestModule
```

The following examples assume the above ASN.1 text exists in a file named `TestModule.asn1`.

How to...

Q: Test the module for syntactic correctness?

A: Issue the following command:

```
asn1c -EF TestModule.asn1
```

This will instruct the asn1c compiler to read the ASN.1 syntax and perform the semantics checking on the module. If the syntax is correct, the module contents will be printed according to compiler's understanding.

Q: Create a C/C++ source code for BER and XER encoder and decoder of the Circle type?

A: Issue the following command:

```
asn1c TestModule.asn1
```

This will instruct the ASN.1 compiler to generate a set of C files which will contain the Circle_t structure definition, as well as the set of encoding and decoding instructions for that structure.

Q: Create a source code for PER decoder and encoder for the Circle type?

A: PER codec generation requires a special command line option:

```
asn1c -gen-PER TestModule.asn1
```

This option will instruct the asn1c compiler to produce the PER codec support as well as BER and XER codecs produced by default.

Q: Generate a working Circle decoder with minimum hassle?

A: After asn1c finishes, compile all generated files with PDU set to Circle:

```
cc -DPDU=Circle
   -I. -o CircleDecoder.exe *.c
```

This will produce an executable which will be able to convert the Circle type between BER/DER/XER/PER formats.

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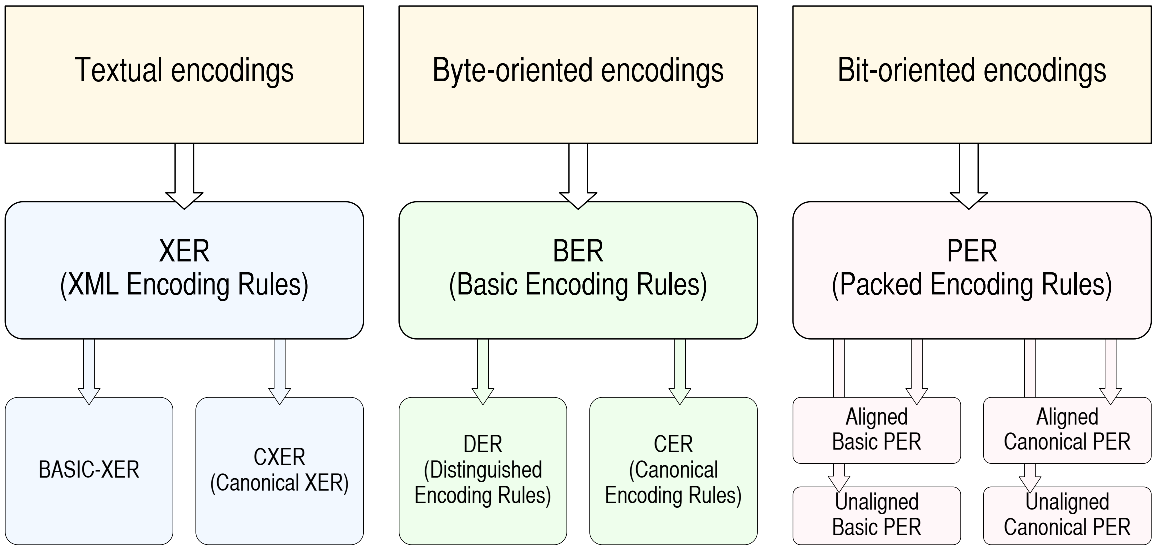
The ASN.1 standard defines a variety of methods to encode data. Depending on space, interoperability and efficiency requirements, a protocol designer selects textual, binary based or compact bit-packed encoding rules.



Encoding variant	Compactness	Interoperability
XER (BASIC or CXER)	Not compact	Human readable UTF-8 XML subset
BER (DER or CER)	Very good	BER decoder can read DER and CER encoded data. Universal debuggers and decoders exist (unber and enber are part of asn1c distribution).
Aligned PER	Nearly best	PER stream decoding can only be done using a corresponding ASN.1 syntax. Unaligned/Aligned variants are incompatible. Basic PER decoder can read Canonical PER encoded data.
Unaligned PER	Best	

Encoding the Circle using XER

```
Circle_t *c;
/* Allocate a new Circle */
c = calloc(1, sizeof *c);
assert(c); /* Infinite memory! */
/* Fill in the data */
c->position_x = 123;
c->position_y = 321;
c->radius = 33;
/* Print out the structure in XER */
xer_fprint(stdout, &asn_DEF_Circle, c);
```

Corresponding XER output

```
<Circle>
  <position-x>123</position-x>
  <position-y>321</position-y>
  <radius>33</radius>
</Circle>
```

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