ASN1C

ASN.1 Compiler
Version 7.3
OER Runtime
Reference Manual

Objective Systems, Inc. version 7.3 — January 2019

Author’s Contact Information

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Modules

- OER Message Buffer Classes

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5.2 OER Message Buffer Classes

Classes

- class ASN1OERMessageBuffer
- class ASN1OEREncodeBuffer
- class ASN1OERDecodeBuffer

5.2.1 Detailed Description

The ASN.1 C++ runtime classes are wrapper classes that provide an object-oriented interface to the ASN.1 C runtime library functions. These classes are derived from the common classes documented in the ASN1C C/C++ Common Runtime Functions manual and are specific the Octet Encoding Rules (OER). These classes manage the buffers for encoding and decoding ASN.1 OER messages.

5.3 OER Runtime Library Functions.

Modules

- OER C Decode Functions.
- OER C Encode Functions.

Functions

- int **oerDecDate** (OSCTXT ∗pctxt, char ∗pString, OSUINT32 flags)
- int **oerDecTimeOfDay** (OSCTXT ∗pctxt, char ∗pString, OSUINT32 flags)
- int **oerEncIdent** (OSCTXT ∗pctxt, OSUINT64 ident)
- OSSIZE oerLenLength (size_t length)
- OSSIZE oerTagLength (ASN1TAG tag)
- int oerWriteIdent (OSUINT64 ident, OSOCTET ∗buffer, OSSIZE bufsize)
- int oerWriteLen (size_t length, OSOCTET ∗buffer, OSSIZE bufsize)
- int oerWriteTag (ASN1TAG tag, OSOCTET ∗buffer, OSSIZE bufsize)

5.3.1 Detailed Description

The ASN.1 Octet Encoding Rules (OER) runtime library contains the low-level constants, types, and functions that are assembled by the compiler to encode/decode more complex structures. The OER low-level C encode/decode functions are identified by their prefixes: oerEnc for encode, oerDec for decode, and oerUtil for utility functions.

5.3.2 Function Documentation

5.3.2.1 oerLenLength()

```
OSSIZE oerLenLength (
             size_t length )
```

Return the number of bytes required to encode the given length.

5.3.2.2 oerTagLength()

```
OSSIZE oerTagLength (
             ASN1TAG tag )
```

Return the number of bytes required to encode the given tag.

5.3.2.3 oerWriteIdent()

```
int oerWriteIdent (
             OSUINT64 ident,
             OSOCTET * buffer,
             OSSIZE bufsize )
```

Encode the given tag identifier into the given buffer.

Returns

# of bytes used or RTERR_BUFOVFLW

5.3.2.4 oerWriteLen()

```
int oerWriteLen (
             size_t length,
             OSOCTET * buffer,
             OSSIZE bufsize )
```

Encode the given length into the given buffer.

Returns

# of bytes used or RTERR_TOOBIG

5.3.2.5 oerWriteTag()

```
int oerWriteTag (
             ASN1TAG tag,
             OSOCTET * buffer,
             OSSIZE bufsize )
```

Encode the given tag into the given buffer.

Returns

# of bytes used or RTERR_BUFOVFLW

5.4 OER C Decode Functions.

Macros

- #define oerDecInt8(pctxt, pvalue) rtxReadBytes(pctxt,pvalue,1)
- #define oerDecUInt8(pctxt, pvalue) rtxReadBytes(pctxt,pvalue,1)
- #define **oerDecUnrestInt** oerDecUnrestInt32
- #define **oerDecUnrestUInt** oerDecUnrestUInt32

Functions

- int oerDecBitStr (OSCTXT ∗pctxt, OSOCTET ∗pvalue, size_t bufsiz, OSUINT32 ∗pnbits)
- int oerDecBitStrExt (OSCTXT ∗pctxt, OSOCTET ∗pvalue, size_t bufsiz, OSUINT32 ∗pnbits, OSOCTET ∗∗extdata)
- int oerDecBMPStr (OSCTXT ∗pctxt, ASN1BMPString ∗pvalue)
- int oerDecChoiceExt (OSCTXT ∗pctxt, ASN1TAG tag, OSOCTET ∗∗ppvalue, OSSIZE ∗pnocts)
- int oerDecUnivStr (OSCTXT ∗pctxt, ASN1UniversalString ∗pvalue)
- int oerDecDynBitStr (OSCTXT ∗pctxt, const OSOCTET ∗∗ppvalue, OSUINT32 ∗pnbits)
- int oerDecCharStr (OSCTXT ∗pctxt, char ∗pvalue, OSSIZE sz)
- int oerDecDynCharStr (OSCTXT ∗pctxt, char ∗∗ppvalue)
- int oerDecDynOctStr (OSCTXT ∗pctxt, OSOCTET ∗∗ppvalue, OSUINT32 ∗pnocts, size_t len)
- int oerDecDynOctStr64 (OSCTXT ∗pctxt, OSOCTET ∗∗ppvalue, OSSIZE ∗pnocts, size_t len)
- int oerDecInt16 (OSCTXT ∗pctxt, OSINT16 ∗pvalue)
- int oerDecInt32 (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecInt64 (OSCTXT ∗pctxt, OSINT64 ∗pvalue)
- int oerDecUnrestInt64 (OSCTXT ∗pctxt, OSINT64 ∗pvalue)
- int oerDecLen (OSCTXT ∗pctxt, OSSIZE ∗plength)
- int oerDecLen32 (OSCTXT ∗pctxt, OSUINT32 ∗plength)
- int oerDecObjId (OSCTXT ∗pctxt, ASN1OBJID ∗pvalue)
- int oerDecRelObjId (OSCTXT ∗pctxt, ASN1OBJID ∗pvalue)
- int oerDecReal (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecReal2 (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecReal10 (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecRealNTCIP (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecFloat (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecDouble (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecSignedEnum (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecTag (OSCTXT ∗pctxt, ASN1TAG ∗ptag)
- int oerDecUInt16 (OSCTXT ∗pctxt, OSUINT16 ∗pvalue)
- int oerDecUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestSignedUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestInt32 (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecUnrestSignedUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecUnrestUInt8 (OSCTXT ∗pctxt, OSUINT8 ∗pvalue)
- int oerDecUnrestUInt16 (OSCTXT ∗pctxt, OSUINT16 ∗pvalue)
- int oerDecUnrestUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecBigInt (OSCTXT ∗pctxt, const char ∗∗ppvalue, int radix)

- int oerDecBigUInt (OSCTXT ∗pctxt, const char ∗∗ppvalue, int radix)
- int oerDecUnrestSize (OSCTXT ∗pctxt, OSSIZE ∗pvalue)
- int oerDecUnsignedEnum (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecDateStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)
- int oerDecDateTimeStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)
- int oerDecDurationStr (OSCTXT ∗pctxt, char ∗∗ppString)
- int oerDecTimeDiffStr (OSCTXT ∗pctxt, char ∗pString)
- int oerDecTimeOfDayStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)

5.4.1 Detailed Description

OER C decode functions handle the decoding of the primitive ASN.1 data types and ASN.1 length and tag fields within a message. Calls to these functions are assembled in the C source code generated by the ASN1C compiler to decode complex ASN.1 structures. These functions are also directly callable from within a user's application program if the need to decode a primitive data item exists.

5.4.2 Macro Definition Documentation

5.4.2.1 oerDecInt8

```
#define oerDecInt8(
              pctxt,
              pvalue ) rtxReadBytes(pctxt,pvalue,1)
```

This macro decodes an OER 8-bit signed integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 16-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.2.2 oerDecUInt8

```
#define oerDecUInt8(
              pctxt,
              pvalue ) rtxReadBytes(pctxt,pvalue,1)
```

This macro decodes an OER 8-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 16-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3 Function Documentation

5.4.3.1 oerDecBigInt()

```
int oerDecBigInt (
             OSCTXT * pctxt,
             const char ** ppvalue,
             int radix )
```

This funcion decodes an OER length determinant and unbound signed integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to a character pointer variable to receive the decoded unsigned value. Dynamic memory is allocated for the variable using the ::rtxMemAlloc function. The memory might be allocated despite the negative return status.
radix	Radix to be used for decoded string. Valid values are 2, 8, 10, or 16.

Returns

Completion status of operation:

- 0 (0) = success,
- ASN_E_NOTCANON successful but encoding was non-canonical (caller may treat this as success or failure, as appropriate)
- negative return value is error.

5.4.3.2 oerDecBigUInt()

```
int oerDecBigUInt (
             OSCTXT * pctxt,
             const char ** ppvalue,
             int radix )
```

This funcion decodes an OER length determinant and unbound unsigned integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to a character pointer variable to receive the decoded unsigned value. Dynamic memory is allocated for the variable using the ::rtxMemAlloc function. The memory might be allocated despite the negative return status.
radix	Radix to be used for decoded string. Valid values are 2, 8, 10, or 16.

Returns

Completion status of operation:

- 0 (0) = success,
- ASN_E_NOTCANON successful but encoding was non-canonical (caller may treat this as success or failure, as appropriate)
- negative return value is error.

5.4.3.3 oerDecBitStr()

```
int oerDecBitStr (
             OSCTXT * pctxt,
             OSOCTET * pvalue,
             size_t bufsiz,
             OSUINT32 * pnbits )
```

This function decodes an OER bit string. This assumes a variable length string. Fixed-sized strings (i.e SIZE(N)) are encoded with no length or unused bit descriptors. This is handled by the compiler.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to static byte array into which data is to be read. The buffer must be large enough to hold the decoded value.
bufsiz	Size of the static byte array into which data is to be read.
pnbits	Pointer to a variable to receive the decoded number of bits.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.4 oerDecBitStrExt()

```
int oerDecBitStrExt (
             OSCTXT * pctxt,
             OSOCTET * pvalue,
             size_t bufsiz,
             OSUINT32 * pnbits,
             OSOCTET ** extdata )
```

This function decodes an OER bit string. This assumes a variable length string. Fixed-sized strings (i.e SIZE(N)) are encoded with no length or unused bit descriptors. This is handled by the compiler. This method handles bit strings with an extdata member present.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to static byte array into which data is to be read. The buffer must be large enough to hold the decoded value.
bufsiz	Size of the static byte array into which data is to be read.
pnbits	Pointer to a variable to receive the decoded number of bits.
extdata	Pointer to byte array containing extension data.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.5 oerDecBMPStr()

```
int oerDecBMPStr (
            OSCTXT * pctxt,
            ASN1BMPString * pvalue )
```

This function decodes an OER BMP string.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to Asn1BMPString structure to be populated with the decoded information.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.6 oerDecCharStr()

```
int oerDecCharStr (
            OSCTXT * pctxt,
            char * pvalue,
            OSSIZE sz )
```

This function decodes an OER character string into a character array.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to character array to receive null-terminated char string. If null, the string is decoded but the content is discarded.
sz	Size of the array. It must be large enough to hold the decoded string with the null terminator.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.7 oerDecChoiceExt()

```
int oerDecChoiceExt (
             OSCTXT * pctxt,
             ASN1TAG tag,
             OSOCTET ** ppvalue,
             OSSIZE * pnocts )
```

This function decodes an unknown CHOICE extension element. It captures the encoded tag, length determinant, and encoding of the alternative itself.

Parameters

pctxt	Pointer to context block structure.
tag	The previously decoded tag, provided so that it can be captured as part of data in ppvalue, for possible later reencoding.
ppvalue	Receives a pointer to dynamically allocated buffer holding the tag, length determinant, and alternative encoding. Memory for the buffer is allocated using the rtxMemAlloc function and should be subsequently freed using the rtxMemFree or rtxMemFreePtr functions.
pnocts	Pointer to variable to receive the size of the data held in the buffer pointed to by ∗ppvalue.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.8 oerDecDateStr()

```
int oerDecDateStr (
             OSCTXT * pctxt,
             char ** ppString,
             OSUINT32 flags )
```

This function is used to decode an ISO 8601 DATE type.

Parameters

pctxt	Pointer to context block structure.
ppString	Pointer to string variable to receive decoded value in string form (YYYY-MM-DD).
flags	Set of flags: OSYEAR, OSMONTH, OSDAY, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.9 oerDecDateTimeStr()

```
int oerDecDateTimeStr (
            OSCTXT * pctxt,
            char ** ppString,
            OSUINT32 flags )
```

This function is used to decode an ISO 8601 DATE-TIME type.

Parameters

pctxt	Pointer to context block structure.
ppString	Pointer to string variable to receive decoded value in string form (YYYY-MM-DDTHH:MM:SS). n - set digit number of fraction part.
flags	Set of flags: OSYEAR, OSMONTH, OSHOURS, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.10 oerDecDouble()

```
int oerDecDouble (
            OSCTXT * pctxt,
            OSREAL * value )
```

This function is used to decode a REAL value that has been constrained to be in the range of the binary64 (double precision) floating-point format specified in IEEE 754.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.11 oerDecDurationStr()

```
int oerDecDurationStr (
            OSCTXT * pctxt,
            char ** ppString )
```

This function is used to decode an ISO 8601 DURATION type.

Parameters

pctxt	Pointer to context block structure.
ppString	Pointer to string variable to receive decoded value in string form (PnYnMnDTnHnMnS).

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.12 oerDecDynBitStr()

```
int oerDecDynBitStr (
            OSCTXT * pctxt,
            const OSOCTET ** ppvalue,
            OSUINT32 * pnbits )
```

This function decodes an OER bit string into a dynamic memory buffer. Memory for the buffer is allocated using the rtx↩ MemAlloc function and should be subsequently freed using the rtxMemFree or rtxMemFreePtr functions. This assumes a variable length string. Fixed-sized strings (i.e SIZE(N)) are encoded with no length or unused bit descriptors. This is handled by the compiler.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to receive pointer to allocated byte buffer.
pnbits	Pointer to a variable to receive the decoded number of bits.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.13 oerDecDynCharStr()

```
int oerDecDynCharStr (
             OSCTXT * pctxt,
             char ** ppvalue )
```

This function decodes an OER character string into a dynamic memory buffer. Memory for the buffer is allocated using the rtxMemAlloc function and should be subsequently freed using the rtxMemFree or rtxMemFreePtr functions.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to receive pointer to null-terminated char string.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.14 oerDecDynOctStr()

```
int oerDecDynOctStr (
             OSCTXT * pctxt,
             OSOCTET ** ppvalue,
             OSUINT32 * pnocts,
             size_t len )
```

This function decodes an OER octet string into a dynamic memory buffer. Memory for the buffer is allocated using the rtxMemAlloc function and should be subsequently freed using the rtxMemFree or rtxMemFreePtr functions.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to receive pointer to allocated byte buffer.
pnocts	Pointer to a variable to receive the decoded number of octets (bytes).
len	Length of string to decoded. If zero, it is assumed the string is variable length and the length is decoded within the funtion.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.15 oerDecDynOctStr64()

```
int oerDecDynOctStr64 (
             OSCTXT * pctxt,
             OSOCTET ** ppvalue,
             OSSIZE * pnocts,
             size_t len )
```

This function decodes an OER octet string into a dynamic memory buffer. Memory for the buffer is allocated using the rtxMemAlloc function and should be subsequently freed using the rtxMemFree or rtxMemFreePtr functions.

Parameters

pctxt	Pointer to context block structure.
ppvalue	Pointer to receive pointer to allocated byte buffer.
pnocts	Pointer to a variable to receive the decoded number of octets (bytes).
len	Length of string to decoded. If zero, it is assumed the string is variable length and the length is decoded within the funtion.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.16 oerDecFloat()

```
int oerDecFloat (
             OSCTXT * pctxt,
             OSREAL * value )
```

This function is used to decode a REAL value that has been constrained to be in the range of the binary32 (single precision) floating-point format specified in IEEE 754.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.17 oerDecInt16()

```
int oerDecInt16 (
             OSCTXT * pctxt,
             OSINT16 * pvalue )
```

This function decodes an OER 16-bit signed integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 16-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.18 oerDecInt32()

```
int oerDecInt32 (
             OSCTXT * pctxt,
             OSINT32 * pvalue )
```

This function decodes an OER 32-bit signed integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 32-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.19 oerDecInt64()

```
int oerDecInt64 (
            OSCTXT * pctxt,
            OSINT64 * pvalue )
```

This function decodes an OER 64-bit signed integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 64-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.20 oerDecLen()

```
int oerDecLen (
            OSCTXT * pctxt,
            OSSIZE * plength )
```

This function is used to decode an OER length determinant value.

Parameters

pctxt	Pointer to context block structure.
plength	Pointer to variable to receive decoded length.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.21 oerDecLen32()

```
int oerDecLen32 (
            OSCTXT * pctxt,
            OSUINT32 * plength )
```

This function is used to decode an OER length determinant value. In this case, the length is restricted to a 32-bit unsigned integer maximum value.

Parameters

pctxt	Pointer to context block structure.
plength	Pointer to variable to receive decoded length.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.22 oerDecObjId()

```
int oerDecObjId (
            OSCTXT * pctxt,
            ASN1OBJID * pvalue )
```

This function is used to decode an OER object identifier value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable to receive decoded value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.23 oerDecReal()

```
int oerDecReal (
            OSCTXT * pctxt,
            OSREAL * value )
```

This function is used to decode an unconstrained REAL value, which may be encoded in base 2 or base 10.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.24 oerDecReal10()

```
int oerDecReal10 (
            OSCTXT * pctxt,
            OSREAL * value )
```

This function is used to decode a REAL value constrained to base 10. The encoding must be in base 10.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.25 oerDecReal2()

```
int oerDecReal2 (
            OSCTXT * pctxt,
            OSREAL * value )
```

This function is used to decode a REAL value constrained to base 2. The encoding must be in base 2.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.26 oerDecRealNTCIP()

```
int oerDecRealNTCIP (
            OSCTXT * pctxt,
            OSREAL * value )
```

This function is used to decode an unconstrained REAL value. The encoding is expected to be in base 10 form, following NTCIP 1102.

Parameters

pctxt	Pointer to context block structure.
value	Pointer to variable to receive decoded the value.

Returns

Completion status of operation:

- 0 (0) = success,

- negative return value is error.

5.4.3.27 oerDecRelObjId()

```
int oerDecRelObjId (
             OSCTXT * pctxt,
             ASN1OBJID * pvalue )
```

This function is used to decode an OER relative object identifier value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable to receive decoded value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.28 oerDecSignedEnum()

```
int oerDecSignedEnum (
             OSCTXT * pctxt,
             OSINT32 * pvalue )
```

This function is used to decode a signed enumerated value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable to receive decoded value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.29 oerDecTag()

```
int oerDecTag (
             OSCTXT * pctxt,
             ASN1TAG * ptag )
```

This function decodes an ASN.1 tag into a standard 32-bit unsigned integer type. The bits used to represent the components of a tag are as follows:

Bit Fields:

- 31-30 Class (00 = UNIV, 01 = APPL, 10 = CTXT, 11 = PRIV)
- 29 Form (not used for OER)
- 28-0 ID code value

Parameters

pctxt	Pointer to context block structure.
ptag	Pointer to variable to receive decoded tag info.

Returns

Completion status of operation: 0 (0) = success, negative return value is error.

5.4.3.30 oerDecTimeDiffStr()

```
int oerDecTimeDiffStr (
             OSCTXT * pctxt,
             char * pString )
```

This function is used to decode an ISO 8601 TIME "DIFF" value.

Parameters

pctxt	Pointer to context block structure.
pString	Pointer to string variable to receive decoded value in string form.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.31 oerDecTimeOfDayStr()

```
int oerDecTimeOfDayStr (
            OSCTXT * pctxt,
            char ** ppString,
            OSUINT32 flags )
```

This function is used to decode an ISO 8601 TIME-OF-DAY type.

Parameters

pctxt	Pointer to context block structure.
ppString	Pointer to string variable to receive decoded value in string form (HH:MM:SS).
flags	Set of flags: OSHOURS, OSMINUTES, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.32 oerDecUInt16()

```
int oerDecUInt16 (
            OSCTXT * pctxt,
            OSUINT16 * pvalue )
```

This function decodes an OER 16-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 16-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.33 oerDecUInt32()

```
int oerDecUInt32 (
            OSCTXT * pctxt,
            OSUINT32 * pvalue )
```

This function decodes an OER 32-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 32-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.34 oerDecUInt64()

```
int oerDecUInt64 (
            OSCTXT * pctxt,
            OSUINT64 * pvalue )
```

This function decodes an OER 64-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 64-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.35 oerDecUnivStr()

```
int oerDecUnivStr (
             OSCTXT * pctxt,
             ASN1UniversalString * pvalue )
```

This function decodes an OER universal string.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to Asn1UniversalString structure to be populated with the decoded information.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.36 oerDecUnrestInt32()

```
int oerDecUnrestInt32 (
             OSCTXT * pctxt,
             OSINT32 * pvalue )
```

This function decodes an OER unrestricted signed integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in a 32-bit integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 32-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.37 oerDecUnrestInt64()

```
int oerDecUnrestInt64 (
             OSCTXT * pctxt,
             OSINT64 * pvalue )
```

This function decodes an OER unrestricted signed integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in a 64-bit signed integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 64-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.38 oerDecUnrestSignedUInt32()

```
int oerDecUnrestSignedUInt32 (
             OSCTXT * pctxt,
             OSUINT32 * pvalue )
```

This function decodes an OER unrestricted signed integer at the current message buffer/stream location and advances the pointer to the next field. The value must fit in an unsigned 32-bit integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 32-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.39 oerDecUnrestSignedUInt64()

```
int oerDecUnrestSignedUInt64 (
             OSCTXT * pctxt,
             OSUINT64 * pvalue )
```

This function decodes an OER unrestricted signed integer at the current message buffer/stream location and advances the pointer to the next field. The value must fit in a 64-bit unsigned integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 64-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.40 oerDecUnrestSize()

```
int oerDecUnrestSize (
             OSCTXT * pctxt,
             OSSIZE * pvalue )
```

This function decodes an OER unrestricted size-typed value at the current message buffer/stream location and advances the pointer to the next field.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded size-typed value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.41 oerDecUnrestUInt16()

```
int oerDecUnrestUInt16 (
             OSCTXT * pctxt,
             OSUINT16 * pvalue )
```

This function decodes an OER unrestricted 16-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in an 16-bit integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 16-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.42 oerDecUnrestUInt32()

```
int oerDecUnrestUInt32 (
             OSCTXT * pctxt,
             OSUINT32 * pvalue )
```

This function decodes an OER unrestricted unsigned integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in a 32-bit integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 32-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.43 oerDecUnrestUInt64()

```
int oerDecUnrestUInt64 (
             OSCTXT * pctxt,
             OSUINT64 * pvalue )
```

This function decodes an OER unrestricted unsigned integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in a 64-bit unsigned integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 64-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.44 oerDecUnrestUInt8()

```
int oerDecUnrestUInt8 (
             OSCTXT * pctxt,
             OSUINT8 * pvalue )
```

This function decodes an OER unrestricted 8-bit unsigned integer at the current message buffer/stream location and advances the pointer to the next field. It is assumed that the value will fit in an 8-bit integer variable.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to decoded 8-bit integer value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.4.3.45 oerDecUnsignedEnum()

```
int oerDecUnsignedEnum (
             OSCTXT * pctxt,
             OSUINT32 * pvalue )
```

This function is used to decode an unsigned enumerated value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable to receive decoded value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5 OER C Encode Functions.

Functions

- int oerEncBigInt (OSCTXT ∗pctxt, const char ∗pvalue, int radix)
- int **oerEncBigIntValue** (OSCTXT ∗pctxt, struct OSBigInt ∗pvalue)
- int oerEncBitStr (OSCTXT ∗pctxt, const OSOCTET ∗pvalue, size_t numbits)
- int oerEncBitStrExt (OSCTXT ∗pctxt, const OSOCTET ∗pvalue, size_t numbits, const OSOCTET ∗extdata, size←
_t dataSize)
- int oerEncBMPStr (OSCTXT ∗pctxt, ASN1BMPString ∗pvalue)
- int oerEncUnivStr (OSCTXT ∗pctxt, ASN1UniversalString ∗pvalue)
- int oerEncExtElem (OSCTXT ∗pctxt, OSRTBuffer ∗pbuffer)
- int oerEncInt (OSCTXT ∗pctxt, OSINT64 value, size_t size)
- int oerEncUnrestInt64 (OSCTXT ∗pctxt, OSINT64 value)
- int oerEncUnrestSignedUInt64 (OSCTXT ∗pctxt, OSUINT64 value)
- int oerEncLen (OSCTXT ∗pctxt, size_t length)
- int oerEncObjId (OSCTXT ∗pctxt, const ASN1OBJID ∗pvalue)
- int oerEncRelObjId (OSCTXT ∗pctxt, const ASN1OBJID ∗pvalue)
- int **oerEncObjId64** (OSCTXT ∗pctxt, const ASN1OID64 ∗pvalue)
- int oerEncOpenExt (OSCTXT ∗pctxt, OSRTDList ∗pElemList)
- int oerEncRelOID64 (OSCTXT ∗pctxt, const ASN1OID64 ∗pvalue)
- int oerEncReal (OSCTXT ∗pctxt, OSREAL value)
- int oerEncReal10 (OSCTXT ∗pctxt, const char ∗object_p)
- int oerEncRealNTCIP (OSCTXT ∗pctxt, OSREAL value)
- int oerEncFloat (OSCTXT ∗pctxt, OSREAL value)
- int oerEncDouble (OSCTXT ∗pctxt, OSREAL value)
- int oerEncSignedEnum (OSCTXT ∗pctxt, OSINT32 value)
- int oerEncTag (OSCTXT ∗pctxt, ASN1TAG tag)
- int oerEncUInt (OSCTXT ∗pctxt, OSUINT64 value, size_t size)
- int oerEncUnrestUInt64 (OSCTXT ∗pctxt, OSUINT64 value)
- int oerEncUnrestInt32 (OSCTXT ∗pctxt, OSINT32 value)
- int oerEncUnrestSignedUInt32 (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncUnrestUInt32 (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncUnrestSize (OSCTXT ∗pctxt, OSSIZE value)
- int oerEncUnsignedEnum (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncDateStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)
- int oerEncDateTimeStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)
- int oerEncDurationStr (OSCTXT ∗pctxt, const char ∗pString)
- int oerEncTimeDiffStr (OSCTXT ∗pctxt, const char ∗pString)
- int oerEncTimeOfDayStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)

5.5.1 Detailed Description

OER C encode functions handle the OER encoding of the primitive ASN.1 data types and ASN.1 length and tag fields within a message. Calls to these functions are assembled in the C source code generated by the ASN1C complier to accomplish the encoding of complex ASN.1 structures. These functions are also directly callable from within a user's application program if the need to accomplish a low level encoding function exists.

5.5.2 Function Documentation

5.5.2.1 oerEncBigInt()

```
int oerEncBigInt (
            OSCTXT * pctxt,
            const char * pvalue,
            int radix )
```

This function encodes an OER length determinant and signed integer at the current message buffer/stream location. The encoding will be canonical.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to a character string representing the integer to be encoded, in the given radix.
radix	Radix of the given integer character string. Valid values are 2, 8, 10, or 16.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.2 oerEncBitStr()

```
int oerEncBitStr (
            OSCTXT * pctxt,
            const OSOCTET * pvalue,
            size_t numbits )
```

This function encodes an OER bit string. This assumes a variable length string. Fixed-sized strings (i.e SIZE(N)) are encoded with no length or unused bit descriptors. This is handled by the compiler.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to binary data to encode.
numbits	Number of bits in the bit string.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.3 oerEncBitStrExt()

```
int oerEncBitStrExt (
            OSCTXT * pctxt,
            const OSOCTET * pvalue,
            size_t numbits,
            const OSOCTET * extdata,
            size_t dataSize )
```

This function encodes an OER bit string. This assumes a variable length string. Fixed-sized strings (i.e SIZE(N)) are encoded with no length or unused bit descriptors. This is handled by the compiler. This method handles bit strings with an extdata member present.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to binary data to encode.
numbits	Number of bits in the bit string.
extdata	Pointer to byte array containing extension data.
dataSize	Size, in octets, of the root bit string data.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.4 oerEncBMPStr()

```
int oerEncBMPStr (
            OSCTXT * pctxt,
            ASN1BMPString * pvalue )
```

This function encodes an OER BMP string.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to Asn1BMPString structure that contains the value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.5 oerEncDateStr()

```
int oerEncDateStr (
             OSCTXT * pctxt,
             const char * pString,
             OSUINT32 flags )
```

This function is used to encode an ISO 8601 DATE type.

Parameters

pctxt	Pointer to context block structure.
pString	Character string variable containing value to be encoded in string form (YYYY-MM-DD).
flags	Set of flags: OSYEAR, OSMONTH, OSDAY, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.6 oerEncDateTimeStr()

```
int oerEncDateTimeStr (
             OSCTXT * pctxt,
             const char * pString,
             OSUINT32 flags )
```

This function is used to encode an ISO 8601 DATE-TIME type.

Parameters

pctxt	Pointer to context block structure.
pString	Character string variable containing value to be encoded in string form (YYYY-MM-DDTHH:MM:SS).
flags	Set of flags: OSYEAR, OSMONTH, OSHOURS, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.7 oerEncDouble()

```
int oerEncDouble (
            OSCTXT * pctxt,
            OSREAL value )
```

This function is used to encode an value of the ASN.1 REAL data type that has been constrained to be in the range of the binary64 (double precision) floating-point format specified in IEEE 754.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.8 oerEncDurationStr()

```
int oerEncDurationStr (
            OSCTXT * pctxt,
            const char * pString )
```

This function is used to encode an ISO 8601 DURATION type.

Parameters

pctxt	Pointer to context block structure.
pString	Character string variable containing value to be encoded in string form (PnYnMnDTnHnMnS).

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.9 oerEncExtElem()

```
int oerEncExtElem (
            OSCTXT * pctxt,
            OSRTBuffer * pbuffer )
```

This function encodes a known extesnion element in a SEQUENCE or similar construct.

Parameters

pctxt	Pointer to context block structure.
pbuffer	Pointer to run-time buffer containing encoded element.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.10 oerEncFloat()

```
int oerEncFloat (
            OSCTXT * pctxt,
            OSREAL value )
```

This function is used to encode an value of the ASN.1 REAL data type that has been constrained to be in the range of the binary32 (single precision) floating-point format specified in IEEE 754.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.11 oerEncInt()

```
int oerEncInt (
             OSCTXT * pctxt,
             OSINT64 value,
             size_t size )
```

This function encodes an OER fixed-size integer (1, 2, 4, or 8 bytes) and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.
size	Size of the encoded field (1, 2, 4, or 8 bytes).

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.12 oerEncLen()

```
int oerEncLen (
             OSCTXT * pctxt,
             size_t length )
```

This function is used to encode an OER length determinant value.

Parameters

pctxt	Pointer to context block structure.
length	The length to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.13 oerEncObjId()

```
int oerEncObjId (
            OSCTXT * pctxt,
            const ASN1OBJID * pvalue )
```

This function is used to encode an OER object identifier value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable containing value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.14 oerEncOpenExt()

```
int oerEncOpenExt (
            OSCTXT * pctxt,
            OSRTDList * pElemList )
```

This function will encode an ASN.1 open type extension. An open type extension field is the data that potentially resides after the ... marker in a version-1 message. The open type structure contains a complete encoded bit set including option element bits or choice index, length, and data. Typically, this data is populated when a version-1 system decodes a version-2 message. The extension fields are retained and can then be re-encoded if a new message is to be sent out (for example, in a store and forward system).

Parameters

pctxt	Pointer to context block structure.
pElemList	A pointer to the open type to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.15 oerEncReal()

```
int oerEncReal (
            OSCTXT * pctxt,
            OSREAL value )
```

This function is used to encode an unconstrained value of the ASN.1 REAL data type. The encoding will be in base 2 form.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.16 oerEncReal10()

```
int oerEncReal10 (
            OSCTXT * pctxt,
            const char * object_p )
```

This function will encode a REAL constrained to base 10 using base 10 encoding (as required). The number is provided to this function as a character string, which may be in integer, decimal, or exponent form.

Parameters

pctxt	Pointer to a context structure. This provides a storage area for the function to store all working variables that must be maintained between function calls.
object←_p	Value to be encoded.

Returns

Length of the encoded message component. A negative status value will be returned if encoding is not successful.

5.5.2.17 oerEncRealNTCIP()

```
int oerEncRealNTCIP (
              OSCTXT * pctxt,
              OSREAL value )
```

This function is used to encode an unconstrained value of the ASN.1 REAL data type. The encoding will be in base 10 form, following NTCIP 1102.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.18 oerEncRelObjId()

```
int oerEncRelObjId (
              OSCTXT * pctxt,
              const ASN1OBJID * pvalue )
```

This function is used to encode an OER relative object identifier value.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable containing value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.19 oerEncRelOID64()

```
int oerEncRelOID64 (
            OSCTXT * pctxt,
            const ASN1OID64 * pvalue )
```

This function is used to encode an OER relative object identifier value. In this case, the arc values can be up to 64-bits in size.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to variable to receive decoded value.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.20 oerEncSignedEnum()

```
int oerEncSignedEnum (
            OSCTXT * pctxt,
            OSINT32 value )
```

This function is used to encode a signed OER enumerated value.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.21 oerEncTag()

```
int oerEncTag (
             OSCTXT * pctxt,
             ASN1TAG tag )
```

This function encodes an ASN.1 tag specified using a standard 32-bit unsigned integer type. The bits used to represent the components of a tag are as follows:

Bit Fields:

- 31-30 Class (00 = UNIV, 01 = APPL, 10 = CTXT, 11 = PRIV)
- 29 Form (not used for OER)
- 28-0 ID code value

Parameters

pctxt	Pointer to context block structure.
tag	Tag value to be encoded.

Returns

Completion status of operation: 0 (0) = success, negative return value is error.

5.5.2.22 oerEncTimeDiffStr()

```
int oerEncTimeDiffStr (
             OSCTXT * pctxt,
             const char * pString )
```

This function is used to encode an ISO 8601 TIME "DIFF" value.

Parameters

pctxt	Pointer to context block structure.
pString	Character string variable containing value to be encoded in string form (HH:MM:SS).

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.23 oerEncTimeOfDayStr()

```
int oerEncTimeOfDayStr (
             OSCTXT * pctxt,
             const char * pString,
             OSUINT32 flags )
```

This function is used to encode an ISO 8601 TIME-OF-DAY type.

Parameters

pctxt	Pointer to context block structure.
pString	Character string variable containing value to be encoded in string form (HH:MM:SS).
flags	Set of flags: OSHOURS, OSMINUTES, etc.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.24 oerEncUInt()

```
int oerEncUInt (
             OSCTXT * pctxt,
             OSUINT64 value,
             size_t size )
```

This function encodes an OER unsigned fixed-size integer (1, 2, 4, or 8 bytes) and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.
size	Size of the encoded field (1, 2, 4, or 8 bytes).

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.25 oerEncUnivStr()

```
int oerEncUnivStr (
             OSCTXT * pctxt,
             ASN1UniversalString * pvalue )
```

This function encodes an OER universal string.

Parameters

pctxt	Pointer to context block structure.
pvalue	Pointer to Asn1UniversalString structure that contains the value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.26 oerEncUnrestInt32()

```
int oerEncUnrestInt32 (
             OSCTXT * pctxt,
             OSINT32 value )
```

This function encodes an OER unrestricted signed integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.27 oerEncUnrestInt64()

```
int oerEncUnrestInt64 (
            OSCTXT * pctxt,
            OSINT64 value )
```

This function encodes a 64-bit signed integer value as an OER unrestricted signed integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.28 oerEncUnrestSignedUInt32()

```
int oerEncUnrestSignedUInt32 (
            OSCTXT * pctxt,
            OSUINT32 value )
```

This function encodes an OER unrestricted signed integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.29 oerEncUnrestSignedUInt64()

```
int oerEncUnrestSignedUInt64 (
            OSCTXT * pctxt,
            OSUINT64 value )
```

This function encodes a 64-bit unsigned integer value as an OER unrestricted signed integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.30 oerEncUnrestSize()

```
int oerEncUnrestSize (
            OSCTXT * pctxt,
            OSSIZE value )
```

This function encodes an OER unrestricted size-typed value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.31 oerEncUnrestUInt32()

```
int oerEncUnrestUInt32 (
             OSCTXT * pctxt,
             OSUINT32 value )
```

This function encodes an OER unrestricted unsigned integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.32 oerEncUnrestUInt64()

```
int oerEncUnrestUInt64 (
             OSCTXT * pctxt,
             OSUINT64 value )
```

This function encodes an unsigned 64-bit integer value as an OER unrestricted unsigned integer value and writes the encoded value to the output buffer/stream.

Parameters

pctxt	Pointer to context block structure.
value	Integer value to be encoded.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

5.5.2.33 oerEncUnsignedEnum()

```
int oerEncUnsignedEnum (
            OSCTXT * pctxt,
            OSUINT32 value )
```

This function is used to encode an unsigned OER enumerated value.

Parameters

pctxt	Pointer to context block structure.
value	The variable containing the value to encode.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

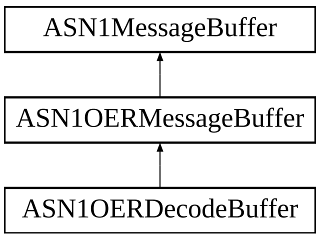
Chapter 6

Class Documentation

6.1 ASN1OERDecodeBuffer Class Reference

```
#include <asn1OerCppTypes.h>
```

Inheritance diagram for ASN1OERDecodeBuffer:



Public Member Functions

- ASN1OERDecodeBuffer ()
- ASN1OERDecodeBuffer (const OSOCTET ∗pMsgBuf, size_t msgBufLen)
- ASN1OERDecodeBuffer (const OSOCTET ∗pMsgBuf, size_t msgBufLen, OSRTContext ∗pContext)
- EXTOERMETHOD ASN1OERDecodeBuffer (OSRTInputStream &istream)
- EXTOERMETHOD ASN1OERDecodeBuffer (const char ∗filePath)
- virtual OSBOOL isA (Type bufferType)
- EXTOERMETHOD int peekByte (OSOCTET &ub)
- EXTOERMETHOD int readBinaryFile (const char ∗filePath)
- EXTOERMETHOD int readBytes (OSOCTET ∗buffer, size_t bufsize, size_t nbytes)

Additional Inherited Members

6.1.1 Detailed Description

The ASN1OERDecodeBuffer class is derived from the ASN1OERMessageBuffer base class. It contains variables and methods specific to decoding ASN.1 OER messages. It is used to manage the input buffer containing the ASN.1 message to be decoded. This class has 3 overloaded constructors.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 ASN1OERDecodeBuffer() [1/5]

```
ASN1OERDecodeBuffer::ASN1OERDecodeBuffer ( )  [inline]
```

This is a default constructor. Use getStatus() method to determine has error occured during the initialization or not.

6.1.2.2 ASN1OERDecodeBuffer() [2/5]

```
ASN1OERDecodeBuffer::ASN1OERDecodeBuffer (
             const OSOCTET * pMsgBuf,
             size_t msgBufLen )  [inline]
```

This constructor is used to describe the message to be decoded. Use getStatus() method to determine has error occured during the initialization or not.

Parameters

pMsgBuf	A pointer to the message to be decoded.
msgBufLen	Length of the message buffer.

6.1.2.3 ASN1OERDecodeBuffer() [3/5]

```
ASN1OERDecodeBuffer::ASN1OERDecodeBuffer (
             const OSOCTET * pMsgBuf,
             size_t msgBufLen,
             OSRTContext * pContext )  [inline]
```

This constructor is used to describe the message to be decoded. Use getStatus() method to determine has error occured during the initialization or not.

Parameters

pMsgBuf	A pointer to the message to be decoded.
msgBufLen	Length of the message buffer.
pContext	A pointer to an OSRTContext structure created by the user.

6.1.2.4 ASN1OERDecodeBuffer() [4/5]

```
EXTOERMETHOD ASN1OERDecodeBuffer::ASN1OERDecodeBuffer (
             OSRTInputStream & istream )
```

This version of the ASN1OERDecodeBuffer constructor takes a reference to an input stream object (stream decoding version).

Parameters

istream	A reference to an input stream object.

6.1.2.5 ASN1OERDecodeBuffer() [5/5]

```
EXTOERMETHOD ASN1OERDecodeBuffer::ASN1OERDecodeBuffer (
             const char * filePath )
```

This constructor takes a pointer to the path of a file containing a binary OER message to be decoded.

Parameters

filePath	Complete file path and name of file to read.

6.1.3 Member Function Documentation

6.1.3.1 isA()

```
virtual OSBOOL ASN1OERDecodeBuffer::isA (
             Type bufferType )  [inline], [virtual]
```

This method checks the type of the message buffer.

Parameters

bufferType	Enumerated identifier specifying a derived class. The only possible value for this class is OERDecode.

Returns

Boolean result of the match operation. True if this is the class corresponding to the identifier argument.

6.1.3.2 peekByte()

```
EXTOERMETHOD int ASN1OERDecodeBuffer::peekByte (
             OSOCTET & ub )
```

This method is used to peek at the next available byte in the decode buffer/stream without advancing the cursor.

Parameters

ub	Single byte buffer to receive peeked byte.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

6.1.3.3 readBinaryFile()

```
EXTOERMETHOD int ASN1OERDecodeBuffer::readBinaryFile (
             const char * filePath )
```

This method reads the file into the buffer to decode.

Parameters

filePath	The zero-terminated string containing the path to the file.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

6.1.3.4 readBytes()

```
EXTOERMETHOD int ASN1OERDecodeBuffer::readBytes (
             OSOCTET * buffer,
             size_t bufsize,
             size_t nbytes )
```

This method is used to read the given number of bytes from the underlying buffer/stream into the given buffer.

Parameters

buffer	Buffer into which data should be read.
bufsize	Size of the buffer
nbytes	Number of bytes to read. Must be <= bufsize.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

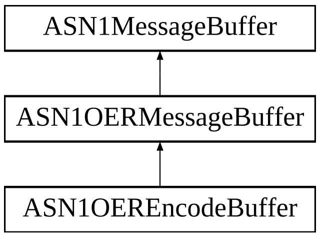
The documentation for this class was generated from the following file:

- asn1OerCppTypes.h

6.2 ASN1OEREncodeBuffer Class Reference

```
#include <asn1OerCppTypes.h>
```

Inheritance diagram for ASN1OEREncodeBuffer:



Public Member Functions

- ASN1OEREncodeBuffer ()
- ASN1OEREncodeBuffer (OSOCTET ∗pMsgBuf, size_t msgBufLen)
- ASN1OEREncodeBuffer (OSOCTET ∗pMsgBuf, size_t msgBufLen, OSRTContext ∗pContext)
- EXTOERMETHOD ASN1OEREncodeBuffer (OSRTOutputStream &ostream)
- int encodeBit (OSBOOL value)
- int encodeBits (const OSOCTET ∗pvalue, size_t nbits, OSUINT32 bitOffset=0)
- virtual EXTOERMETHOD OSOCTET ∗ getMsgCopy ()
- virtual EXTOERMETHOD const OSOCTET ∗ getMsgPtr ()
- EXTOERMETHOD int init ()
- virtual OSBOOL isA (Type bufferType)
- EXTOERMETHOD int writeBytes (const OSOCTET ∗buffer, size_t nbytes)

Additional Inherited Members

6.2.1 Detailed Description

The ASN1OEREncodeBuffer class is derived from the ASN1OERMessageBuffer base class. It contains variables and methods specific to encoding ASN.1 messages. It is used to manage the buffer into which an ASN.1 OER message is to be encoded.

6.2.2 Constructor & Destructor Documentation

6.2.2.1 ASN1OEREncodeBuffer() [1/4]

```
ASN1OEREncodeBuffer::ASN1OEREncodeBuffer ( )  [inline]
```

This version of the ASN1OEREncodeBuffer constructor creates a dynamic memory buffer into which an OER message is encoded.

6.2.2.2 ASN1OEREncodeBuffer() [2/4]

```
ASN1OEREncodeBuffer::ASN1OEREncodeBuffer (
              OSOCTET * pMsgBuf,
              size_t msgBufLen )  [inline]
```

This version of the ASN1OEREncodeBuffer constructor takes a message buffer and size argument (static encoding version).

Parameters

pMsgBuf	A pointer to a fixed-size message buffer to receive the encoded message.
msgBufLen	Size of the fixed-size message buffer.

6.2.2.3 ASN1OEREncodeBuffer() [3/4]

```
ASN1OEREncodeBuffer::ASN1OEREncodeBuffer (
              OSOCTET * pMsgBuf,
              size_t msgBufLen,
              OSRTContext * pContext )  [inline]
```

This version of the ASN1OEREncodeBuffer constructor takes a message buffer and size argument (static encoding version) as well as a pointer to an existing context object.

Parameters

pMsgBuf	A pointer to a fixed-size message buffer to receive the encoded message.
msgBufLen	Size of the fixed-size message buffer.
pContext	A pointer to an OSRTContext structure created by the user.

6.2.2.4 ASN1OEREncodeBuffer() [4/4]

```
EXTOERMETHOD ASN1OEREncodeBuffer::ASN1OEREncodeBuffer (
              OSRTOutputStream & ostream )
```

This version of the ASN1OEREncodeBuffer constructor takes a reference to an output stream object (stream encoding version).

Parameters

ostream	A reference to an output stream object.

6.2.3 Member Function Documentation

6.2.3.1 encodeBit()

```
int ASN1OEREncodeBuffer::encodeBit (
              OSBOOL value )  [inline]
```

This method writes a single encoded bit value to the output buffer or stream.

Parameters

value	Boolean value of bit to be written.

Returns

Status of operation: 0 = success, negative value if error occurred.

6.2.3.2 encodeBits()

```
int ASN1OEREncodeBuffer::encodeBits (
            const OSOCTET * pvalue,
            size_t nbits,
            OSUINT32 bitOffset = 0 )  [inline]
```

This method writes the given number of bits from the byte array to the output buffer or stream starting from the given bit offset.

Parameters

pvalue	Pointer to byte array containing data to be encoded.
nbits	Number of bits to copy from byte array to encode buffer.
bitOffset	Starting bit offset from which bits are to be copied.

Returns

Status of operation: 0 = success, negative value if error occurred.

6.2.3.3 getMsgCopy()

```
virtual EXTOERMETHOD OSOCTET* ASN1OEREncodeBuffer::getMsgCopy ( )  [virtual]
```

This method returns a copy of the current encoded message. Memory is allocated for the message using the 'new' operation. It is the user's responsibility to free the memory using 'delete'.

Returns

Pointer to copy of encoded message. It is the user's responsibility to release the memory using the 'delete' operator (i.e., delete [] ptr;)

6.2.3.4 getMsgPtr()

```
virtual EXTOERMETHOD const OSOCTET* ASN1OEREncodeBuffer::getMsgPtr ( )  [virtual]
```

This method returns the internal pointer to the current encoded message.

Returns

Pointer to encoded message.

6.2.3.5 init()

```
EXTOERMETHOD int ASN1OEREncodeBuffer::init ( )
```

This method reinitializes the encode buffer pointer to allow a new message to be encoded. This makes it possible to reuse one message buffer object in a loop to encode multiple messages. After this method is called, any previously encoded message in the buffer will be overwritten on the next encode call.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

6.2.3.6 isA()

```
virtual OSBOOL ASN1OEREncodeBuffer::isA (
             Type bufferType )  [inline], [virtual]
```

This method checks the type of the message buffer.

Parameters

bufferType	Enumerated identifier specifying a derived class. The only possible value for this class is OEREncode.

Returns

Boolean result of the match operation. True if this is the class corresponding to the identifier argument.

6.2.3.7 writeBytes()

```
EXTOERMETHOD int ASN1OEREncodeBuffer::writeBytes (
             const OSOCTET * buffer,
             size_t nbytes )
```

This method is used to write the given number of bytes from the given buffer to the encode buffer or stream.

Parameters

buffer	Buffer from which data should be read.
nbytes	Number of bytes to write.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

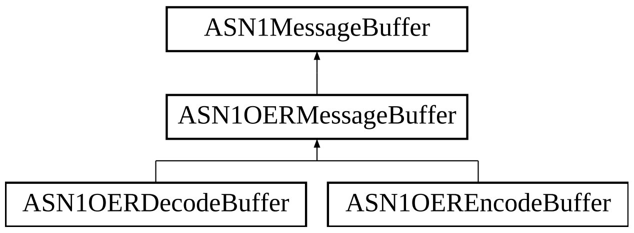
The documentation for this class was generated from the following file:

- asn1OerCppTypes.h

6.3 ASN1OERMessageBuffer Class Reference

```
#include <asn1OerCppTypes.h>
```

Inheritance diagram for ASN1OERMessageBuffer:



Public Member Functions

- void binDump (const char ∗)
- void hexDump ()
- virtual size_t getMsgLen ()
- EXTOERMETHOD int setBuffer (const OSOCTET ∗pMsgBuf, size_t msgBufLen)
- void setTrace (OSBOOL)

Protected Member Functions

- EXTOERMETHOD ASN1OERMessageBuffer (Type bufferType)
- EXTOERMETHOD ASN1OERMessageBuffer (OSRTStream &stream)
- EXTOERMETHOD ASN1OERMessageBuffer (Type bufferType, OSOCTET ∗pMsgBuf, size_t msgBufLen)
- EXTOERMETHOD ASN1OERMessageBuffer (Type bufferType, OSOCTET ∗pMsgBuf, size_t msgBufLen, OS↩ RTContext ∗pContext)

6.3.1 Detailed Description

The ASN1OERMessageBuffer class is derived from the ASN1MessageBuffer base class. It is the base class for the ASN1OEREncodeBuffer and ASN1OERDecodeBuffer derived classes. It contains variables and methods specific to encoding or decoding ASN.1 messages using the Octet Encoding Rules (OER). It is used to manage the buffer into which an ASN.1 message is to be encoded or decoded.

6.3.2 Constructor & Destructor Documentation

6.3.2.1 ASN1OERMessageBuffer() [1/4]

```
EXTOERMETHOD ASN1OERMessageBuffer::ASN1OERMessageBuffer (
            Type bufferType )  [protected]
```

This constructor does not set a OER input source. It is used by the derived encode buffer classes. Use the getStatus() method to determine if an error has occured during initialization.

Parameters

bufferType	Type of message buffer that is being created (for example, OEREncode or OERDecode).

6.3.2.2 ASN1OERMessageBuffer() [2/4]

```
EXTOERMETHOD ASN1OERMessageBuffer::ASN1OERMessageBuffer (
            OSRTStream & stream )  [protected]
```

This constructor associates a stream with a OER encode or decode buffer. It is used by the derived encode buffer classes to create a stream-based OER encoder or decoder.

Parameters

stream	Stream class reference.

6.3.2.3 ASN1OERMessageBuffer() [3/4]

```
EXTOERMETHOD ASN1OERMessageBuffer::ASN1OERMessageBuffer (
            Type bufferType,
            OSOCTET * pMsgBuf,
            size_t msgBufLen )  [protected]
```

This constructor allows a memory buffer holding a binary OER message to be specified. Use the getStatus() method to determine if an error has occured during initialization.

Parameters

bufferType	Type of message buffer that is being created (for example, OEREncode or OERDecode).
pMsgBuf	A pointer to a fixed size message buffer to recieve the encoded message.
msgBufLen	Size of the fixed-size message buffer.

6.3.2.4 ASN1OERMessageBuffer() [4/4]

```
EXTOERMETHOD ASN1OERMessageBuffer::ASN1OERMessageBuffer (
             Type bufferType,
             OSOCTET * pMsgBuf,
             size_t msgBufLen,
             OSRTContext * pContext )  [protected]
```

This constructor allows a memory buffer holding a binary OER message to be specified. It also allows a pre-existing context to be associated with this buffer. Use the getStatus() method to determine if an error has occured during initialization.

Parameters

bufferType	Type of message buffer that is being created (for example, OEREncode or OERDecode).
pMsgBuf	A pointer to a fixed size message buffer to recieve the encoded message.
msgBufLen	Size of the fixed-size message buffer.
pContext	A pointer to an OSRTContext structure.

6.3.3 Member Function Documentation

6.3.3.1 binDump()

```
void ASN1OERMessageBuffer::binDump (
             const char * )  [inline]
```

Binary dump not supported for OER. Method is needed as a placeholder for client/server code generation.

6.3.3.2 getMsgLen()

```
virtual size_t ASN1OERMessageBuffer::getMsgLen ( )  [inline], [virtual]
```

This method returns the length of a previously encoded PER message.

Parameters

-	none

6.3.3.3 hexDump()

```
void ASN1OERMessageBuffer::hexDump ( )  [inline]
```

This method outputs a hexadecimal dump of the current buffer contents to stdout.

Parameters

-	none

6.3.3.4 setBuffer()

```
EXTOERMETHOD int ASN1OERMessageBuffer::setBuffer (
             const OSOCTET * pMsgBuf,
             size_t msgBufLen )
```

This method sets a buffer to receive the encoded message.

Parameters

pMsgBuf	A pointer to a memory buffer to use to encode a message. The buffer should be declared as an array of unsigned characters (OSOCTETs). This parameter can be set to NULL to specify dynamic encoding (i.e., the encode functions will dynamically allocate a buffer for the message).
msgBufLen	The length of the memory buffer in bytes. If pMsgBuf is NULL, this parameter specifies the initial size of the dynamic buffer; if 0 - the default size will be used.

Returns

Completion status of operation:

- 0 (0) = success,
- negative return value is error.

6.3.3.5 setTrace()

```
void ASN1OERMessageBuffer::setTrace (
             OSBOOL  )  [inline]
```

Set bit trace not supported for OER. Method is needed as a placeholder for client/server code generation.

The documentation for this class was generated from the following file:

- asn1OerCppTypes.h

Chapter 7

File Documentation

7.1 asn1oer.h File Reference

```
#include "rtsrc/asn1type.h"
#include "rtsrc/asn1CharSet.h"
#include "rtxsrc/rtxBuffer.h"
```

Macros

- #define **EXTOERMETHOD**
- #define **EXTERNOER**
- #define **EXTOERCLASS**
- #define oerDecInt8(pctxt, pvalue) rtxReadBytes(pctxt,pvalue,1)
- #define oerDecUInt8(pctxt, pvalue) rtxReadBytes(pctxt,pvalue,1)
- #define **oerDecUnrestInt** oerDecUnrestInt32
- #define **oerDecUnrestUInt** oerDecUnrestUInt32

Functions

- int oerDecBitStr (OSCTXT ∗pctxt, OSOCTET ∗pvalue, size_t bufsiz, OSUINT32 ∗pnbits)
- int oerDecBitStrExt (OSCTXT ∗pctxt, OSOCTET ∗pvalue, size_t bufsiz, OSUINT32 ∗pnbits, OSOCTET ∗∗extdata)
- int oerDecBMPStr (OSCTXT ∗pctxt, ASN1BMPString ∗pvalue)
- int oerDecChoiceExt (OSCTXT ∗pctxt, ASN1TAG tag, OSOCTET ∗∗ppvalue, OSSIZE ∗pnocts)
- int oerDecUnivStr (OSCTXT ∗pctxt, ASN1UniversalString ∗pvalue)
- int oerDecDynBitStr (OSCTXT ∗pctxt, const OSOCTET ∗∗ppvalue, OSUINT32 ∗pnbits)
- int oerDecCharStr (OSCTXT ∗pctxt, char ∗pvalue, OSSIZE sz)
- int oerDecDynCharStr (OSCTXT ∗pctxt, char ∗∗ppvalue)
- int oerDecDynOctStr (OSCTXT ∗pctxt, OSOCTET ∗∗ppvalue, OSUINT32 ∗pnocts, size_t len)
- int oerDecDynOctStr64 (OSCTXT ∗pctxt, OSOCTET ∗∗ppvalue, OSSIZE ∗pnocts, size_t len)
- int oerDecInt16 (OSCTXT ∗pctxt, OSINT16 ∗pvalue)

- int oerDecInt32 (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecInt64 (OSCTXT ∗pctxt, OSINT64 ∗pvalue)
- int oerDecUnrestInt64 (OSCTXT ∗pctxt, OSINT64 ∗pvalue)
- int oerDecLen (OSCTXT ∗pctxt, OSSIZE ∗plength)
- int oerDecLen32 (OSCTXT ∗pctxt, OSUINT32 ∗plength)
- int oerDecObjId (OSCTXT ∗pctxt, ASN1OBJID ∗pvalue)
- int oerDecRelObjId (OSCTXT ∗pctxt, ASN1OBJID ∗pvalue)
- int oerDecReal (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecReal2 (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecReal10 (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecRealNTCIP (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecFloat (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecDouble (OSCTXT ∗pctxt, OSREAL ∗value)
- int oerDecSignedEnum (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecTag (OSCTXT ∗pctxt, ASN1TAG ∗ptag)
- int oerDecUInt16 (OSCTXT ∗pctxt, OSUINT16 ∗pvalue)
- int oerDecUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestSignedUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestUInt64 (OSCTXT ∗pctxt, OSUINT64 ∗pvalue)
- int oerDecUnrestInt32 (OSCTXT ∗pctxt, OSINT32 ∗pvalue)
- int oerDecUnrestSignedUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecUnrestUInt8 (OSCTXT ∗pctxt, OSUINT8 ∗pvalue)
- int oerDecUnrestUInt16 (OSCTXT ∗pctxt, OSUINT16 ∗pvalue)
- int oerDecUnrestUInt32 (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecBigInt (OSCTXT ∗pctxt, const char ∗∗ppvalue, int radix)
- int oerDecBigUInt (OSCTXT ∗pctxt, const char ∗∗ppvalue, int radix)
- int oerDecUnrestSize (OSCTXT ∗pctxt, OSSIZE ∗pvalue)
- int oerDecUnsignedEnum (OSCTXT ∗pctxt, OSUINT32 ∗pvalue)
- int oerDecDateStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)
- int oerDecDateTimeStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)
- int oerDecDurationStr (OSCTXT ∗pctxt, char ∗∗ppString)
- int oerDecTimeDiffStr (OSCTXT ∗pctxt, char ∗pString)
- int oerDecTimeOfDayStr (OSCTXT ∗pctxt, char ∗∗ppString, OSUINT32 flags)
- int oerEncBigInt (OSCTXT ∗pctxt, const char ∗pvalue, int radix)
- int **oerEncBigIntValue** (OSCTXT ∗pctxt, struct OSBigInt ∗pvalue)
- int oerEncBitStr (OSCTXT ∗pctxt, const OSOCTET ∗pvalue, size_t numbits)
- int oerEncBitStrExt (OSCTXT ∗pctxt, const OSOCTET ∗pvalue, size_t numbits, const OSOCTET ∗extdata, size↩
  _t dataSize)
- int oerEncBMPStr (OSCTXT ∗pctxt, ASN1BMPString ∗pvalue)
- int oerEncUnivStr (OSCTXT ∗pctxt, ASN1UniversalString ∗pvalue)
- int oerEncExtElem (OSCTXT ∗pctxt, OSRTBuffer ∗pbuffer)
- int oerEncInt (OSCTXT ∗pctxt, OSINT64 value, size_t size)
- int oerEncUnrestInt64 (OSCTXT ∗pctxt, OSINT64 value)
- int oerEncUnrestSignedUInt64 (OSCTXT ∗pctxt, OSUINT64 value)
- int oerEncLen (OSCTXT ∗pctxt, size_t length)
- int oerEncObjId (OSCTXT ∗pctxt, const ASN1OBJID ∗pvalue)
- int oerEncRelObjId (OSCTXT ∗pctxt, const ASN1OBJID ∗pvalue)
- int **oerEncObjId64** (OSCTXT ∗pctxt, const ASN1OID64 ∗pvalue)
- int oerEncOpenExt (OSCTXT ∗pctxt, OSRTDList ∗pElemList)
- int oerEncRelOID64 (OSCTXT ∗pctxt, const ASN1OID64 ∗pvalue)

- int oerEncReal (OSCTXT ∗pctxt, OSREAL value)
- int oerEncReal10 (OSCTXT ∗pctxt, const char ∗object_p)
- int oerEncRealNTCIP (OSCTXT ∗pctxt, OSREAL value)
- int oerEncFloat (OSCTXT ∗pctxt, OSREAL value)
- int oerEncDouble (OSCTXT ∗pctxt, OSREAL value)
- int oerEncSignedEnum (OSCTXT ∗pctxt, OSINT32 value)
- int oerEncTag (OSCTXT ∗pctxt, ASN1TAG tag)
- int oerEncUInt (OSCTXT ∗pctxt, OSUINT64 value, size_t size)
- int oerEncUnrestUInt64 (OSCTXT ∗pctxt, OSUINT64 value)
- int oerEncUnrestInt32 (OSCTXT ∗pctxt, OSINT32 value)
- int oerEncUnrestSignedUInt32 (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncUnrestUInt32 (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncUnrestSize (OSCTXT ∗pctxt, OSSIZE value)
- int oerEncUnsignedEnum (OSCTXT ∗pctxt, OSUINT32 value)
- int oerEncDateStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)
- int oerEncDateTimeStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)
- int oerEncDurationStr (OSCTXT ∗pctxt, const char ∗pString)
- int oerEncTimeDiffStr (OSCTXT ∗pctxt, const char ∗pString)
- int oerEncTimeOfDayStr (OSCTXT ∗pctxt, const char ∗pString, OSUINT32 flags)
- int **oerDecDate** (OSCTXT ∗pctxt, char ∗pString, OSUINT32 flags)
- int **oerDecTimeOfDay** (OSCTXT ∗pctxt, char ∗pString, OSUINT32 flags)
- int **oerEncIdent** (OSCTXT ∗pctxt, OSUINT64 ident)
- OSSIZE oerLenLength (size_t length)
- OSSIZE oerTagLength (ASN1TAG tag)
- int oerWriteIdent (OSUINT64 ident, OSOCTET ∗buffer, OSSIZE bufsize)
- int oerWriteLen (size_t length, OSOCTET ∗buffer, OSSIZE bufsize)
- int oerWriteTag (ASN1TAG tag, OSOCTET ∗buffer, OSSIZE bufsize)

7.1.1 Detailed Description

ASN.1 runtime constants, data structure definitions, and functions to support the Octet Encoding Rules (OER) as defined in the National Transportation Communications for ITS Protocol (NTCIP) 1102 standard.

7.2 asn1OerCppTypes.h File Reference

```
#include "rtoersrc/asn1oer.h"
#include "rtsrc/asn1CppTypes.h"
#include "rtxsrc/rtxBitEncode.h"
#include "rtxsrc/rtxHexDump.h"
```

Classes

- class ASN1OERMessageBuffer
- class ASN1OEREncodeBuffer
- class ASN1OERDecodeBuffer

7.2.1 Detailed Description

OER C++ type and class definitions.

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