or

```
+1 518-283-8860 x1234
```

In general, the syntax is:

```
"+" <country code> <national number> [ "x" <extension> ]
```

Matching is as defined for CaseExactString, except that all space and "–" characters are skipped during the comparison.

10.1.11 PostalAddress

Standard Attributes
postalAddress
registeredAddress
homePostalAddress

```
<PostalAddressValue> ::= <address_component> |
                         <address_component> "$" <address>
<address_component> = <StringValue>
```

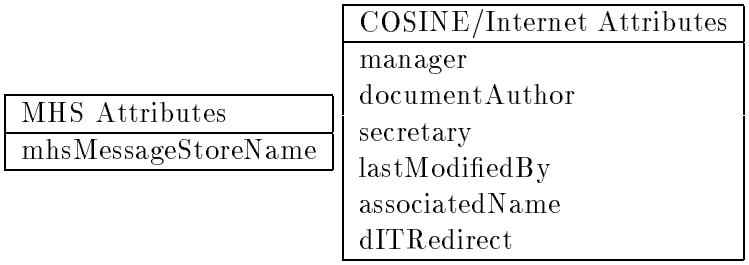
For example `UCL $ Gower Street $ London`. You are limited to a maximum of 6 `<address_component>`'s, each with a maximum of 30 characters. (Note each `<address_component>` can include T.61 strings; see Section 10.1.2 for details of this).

Note: substring matching is not supported by QUIPU for this syntax.

10.1.12 DN

Standard Attributes
aliasedObjectName
member
owner
roleOccupant
seeAlso

QUIPU Attributes
masterDSA
slaveDSA
relayDSA




```
<DNValue> ::= <name>
```

Distinguished names are discussed in Section 3.2.3, the BNF is repeated for completeness:

```
<DNValue> ::= <rdn> | <rdn> "@" <DNValue>
<rdn> ::= <attribute> | <attribute> "%" <rdn>
```

The DNs held by the attribute have the following meanings:

`aliasedObjectName`: The name of an aliased object.

`member`: Specifies a member of a `groupOfNames`.

`owner`: The name of the person responsible for the associated object.

`roleOccupant`: The person who fills an organisational role.

`seeAlso`: Other objects that may be of interest.

`masterDSA`: The DSA holding the master EDB file.

`slaveDSA`: DSAs holding slave EDB files.

`relayDSA`: A DSA to relay operations to if your DSA is not connected to a needed network community. Section 14.2.3 describes this in more detail.

`manager`: The manager of a DSA.

`documentAuthor`: Author of a document.

`secretary`: The name of a personal Secretary.

`lastModifiedBy`: The object that last modified the referenced object.

`associatedName`: The DN associated with a DNS domain.

10.1.13 OID

Standard Attributes
supportedApplicationContext

MHS Attributes
mhsDeliverableContentTypes
mhsDeliverableEits
mhsSupportedAutomaticActions
mhsSupportedContentTypes
mhsSupportedOptionalAttributes

```
<OIDValue> ::= <oid>
```

All the syntaxes in this section are represented by OIDs as follows:

```
<oid> ::= <keystring> "." <numericoid> |
          <keystring> |
          <numericoid>
<numericoid> ::= <numericstring> |
                 <numericstring> "." <numericoid>
```

For example `2.3.4.2` or `attribute.6`.

In general, the value will be a string using oidtable mappings.

10.1.14 ObjectClass

Standard Attributes
objectClass

Although essentially an OID, a separate syntax is provided as an OID has additional semantics when used as an object class.

10.1.15 TelexNumber

Standard Attributes
telexNumber

```
<TelexNumberValue> ::= <printablestring> "$"
                       <printablestring> "$"
                       <printablestring>
```

This is used to represent `number $ country $ answerback`, for example `007 28722 $ G $ UCLPHYS`.

10.1.16 TeletexTerminalIdentifier

Standard Attributes
teletexTerminalIdentifier

```
<TeletexTerminalIdentifierValue> ::= <printablestring>
              "$" <optstr> "$"  <optstr> "$" <optstr>
              "$" <optstr> "$" <optstr>
<optstr> ::= <printablestring> | (null)
```

Used to represent

```
terminal $ graphic $ control $ page $ misc $ private
```

10.1.17 FacsimileTelephoneNumber

Standard Attributes
facsimileTelephoneNumber

```
<FacsimileTelephoneNumberValue> ::= <printablestring>
                                    [ "$" <faxparameters> ]
<faxparameters> ::= <faxparm> | <faxparm>
                    "$" <faxparameters>
<faxparm> ::= "twoDimensional" | "fineResolution" |
              "unlimitedLength" | "b4Length" |
              "a3Width" | "b4Width" | "uncompressed"
```

For example `+44 602 123-4567 $ twoDimensional`

10.1.18 DeliveryMethod

Standard Attributes	MHS Attributes
preferredDeliveryMethod	mhsPreferredDeliveryMethods

```
<DeliveryValue> = <pdm_component> |
                  <pdm_component> "$" <pdm>
pdm_component = "any" | "mhs" | "physical" | "telex" |
                "teletex" | "g3fax" | "g4fax" | "ia5" |
                "videotex" | "telephone"
```

For example `mhs $ telephone`.

10.1.19 PresentationAddress

Standard Attributes
presentationAddress

For more details see Section 14.2.1, *Volume One* of this manual and [Kil89a].

10.1.20 Password

Standard Attributes
userPassword

See Section 11.1 for a discussion of this attribute.

10.1.21 Certificate

Standard Attributes
userCertificate cACertificate

```
<CertificateValue> ::= <Algorithm> "#"
            <EncryptedValue> "#" <Issuer> "#"
            <Subject> "#" <Algorithm> "#"
            <ProtocolVersion> "#" <Serial> "#"
            <Validity> "#" <Algorithm> "#"
            <EncryptedValue>

<Algorithm> ::= <OID> "#" <AlgorithmParameters>
<AlgorithmParameters> ::= | <IntegerValue> |
                            "{ASN}" <HexString>
<Issuer> ::= <DN>
<Subject> ::= <DN>
<ProtocolVersion> ::= <IntegerValue>
<Serial> ::= <IntegerValue>
<Validity> ::= <UTCTime> "#" <UTCTime>
<EncryptedValue> ::= <HexString> | <HexString> "-" <Digit>
```

10.1.22 CertificatePair

Standard Attributes
crossCertificatePair

```
<CertificatePairValue> ::= [<CertificateValue>] "|"
                           [<CertificateValue>]
```

At least one certificate should be present, although QUIPU will not enforce this.

10.1.23 CertificateList

Standard Attributes
authorityRevocationList
certificateRevocationList

```
<CertificateListValue> ::= <AlgorithmValue> "#"
                <Issuer> "#"
                <AlgorithmValue> "#" <EncryptedValue> "#"
                <UTCTime> ["#" <RevokedCertificates>]

<RevokedCertificates> ::= <AlgorithmValue> "#"
                 <EncryptedValue>
                 [ "#" *(<RevokedCertificate> "#") ]

<RevokedCertificate> ::= <Subject> "#"
                 <AlgorithmValue> "#"
                 <SerialNumber> "#" <UTCTime>
```

10.1.24 Guide

Standard Attributes
searchGuide

```
<GuideValue>   ::= [<objectClass> "#"] <Criteria>
<Criteria>     ::= <CriteriaItem> | <CriteriaSet> |
                   "!" <Criteria>
```

```
<CrtieriaSet>  ::= ["("] Criteria "@" CriteriaSet [")"] |
                   ["("] Criteria "|" CriteriaSet [")"]
<CriteriaItem> ::= ["("] <attributetype> "$"
                   <matchType> [")"]
<matchType>    ::= "EQ" | "SUBSTR" | "GE" |
                   "LE" | "APPROX"
```

Note the use of `@` for "and", as the `&` symbol has other meaning here. Some examples of Search Guide are:

```
Person # commonName $ APPROX
( organization $ EQ ) @ (commonName $ SUBSTR)
( organization $ EQ ) @ ((commonName $ SUBSTR) | \
                         (commonName $ EQ))
```

10.1.25 UTCTime

Standard Attributes
lastModifiedTime

```
<UTCTimeValue> ::= <printablestring>
```

The string should be formatted using the template `yymmddhhmmssz` where `yy` represents the year; `mm` represents the month; `dd` represents the day; `hh` represents hours; `mm` represents minutes; `ss` represents seconds; `z` represents the timezone.

For example the string `890602093221Z` is used to represent 09:32:21 at GMT, on June 2nd, 1989.

10.1.26 Boolean

No attributes use this syntax.

```
<BooleanValue> ::= <boolean>
<boolean>      ::= "TRUE" | "FALSE"
```

10.1.27 Integer

MHS Attributes
mhsDeliverableContentLength

```
<IntegerValue> ::= <d>
```

10.1.28 AccessPoint

QUIPU Attributes
subordinateReference
crossReference
nonSpecificSubordinateReference

```
<AccessPointValue> ::= <DN> "#" <PresentationAddress>
```

These attribute are used to give references to non-QUIPU DSAs and are discussed in Section 14.6.

10.2 QUIPU Attribute Syntaxes

10.2.1 ACL

QUIPU Attributes
accessControlList

```
<aclvalue> ::= <aclwho> "#" <aclwhat> "#" <acltype> ["#"]
<aclwho> ::= "self" | "others" | "group #" <namelist> |
"prefix #" <namelist>
<aclwhat> ::= "none" | "detect" | "compare" |
                    "read" | "add" | "write"
<acltype> ::= "child" | "entry" | "default" |
                    "attributes #" <oidlist>
<oidlist> ::= <oid> | <oidlist> "$" <oid>
```

The use of ACL is discussed in Section 11.2.

10.2.2 Schema

QUIPU Attributes
treeStructure

Schema is currently represented by a single OID, and discussed fully in Section 14.7.

10.2.3 ProtectedPassword

QUIPU Attributes
protectedPassword

```
<ProtectedPasswordValue> ::= <StringValue>
```

The password encryption mechanism is encapsulated within the matching rules for this attribute; two values are "equal" if they are identically equal or if one is an encrypted representation of the other.

Note that "equals" is not transitive for this attribute: If $a = b$ and $b = c$, testing $a = c$ may give "incomparable" rather than "true" as the result. The reason for this is that in some circumstances properly testing this attribute for equality would consume an unacceptable amount of time. The security of the encryption mechanism depends on this!

10.2.4 SecurityPolicy

QUIPU Attributes
entrySecurityPolicy
dsaDefaultSecurityPolicy
dsaPermittedSecurityPolicy

This attribute is currently handled as "ASN.1", see Section 10.5.

10.2.5 EdbInfo

QUIPU Attributes
eDBinfo

```
<EdbInfoValue> ::= <name> "#" <name> "#" <namelist> ["#"]
```

This attribute is discussed in Section 14.10.

10.2.6 InheritedAttribute

QUIPU Attributes
InheritedAttribute

```
<InheritedAttributeValue> ::= [ <oid> "$" ]
                              [ "always" <InheritedList> ]
                              [ "default" <InheritedList> ]
<InheritedList> ::= "(" NEWLINE <AttributeSequence>
                    NEWLINE ")"
```

This attribute is discussed in Section 14.7.5.

10.3 COSINE/Internet Attribute Syntaxes

As well the attribute syntaxes defined by X.500, QUIPU recognises and uses those defined by the COSINE/Internet schema document [BK91]. This document is a sucessor to the Thorn syntaxes [Kil89c] used in previous version of QUIPU.

10.3.1 Mailbox

COSINE/Internet Attributes
otherMailbox

```
<MailboxValue> ::= <printablestring> "$" <IA5String>
```

For example `internet $ quipu-support@cs.ucl.ac.uk`.

10.3.2 CaseIgnoreIA5String

COSINE/Internet Attributes
rfc822Mailbox
domainComponent
nRSTextualDescription
associatedDomain

These attributes are handled as IA5Strings, but use the matching rules for the CaseIgnoreString syntax.