

**CORBA Interface Definition Language (IDL)
specifications (9M150203.doc – CSR inquiry)**

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DRAFT STANDARD

TITLE Operations, Administration, Maintenance, and Provisioning (OAM&P) – Model for Interface Across Jurisdictional Boundaries to Support Electronic Access Service Ordering: Inquiry Function

SOURCE Jim Killian, Technical Editor

PROJECT Protocol Standards for Communication between Operating Systems across Jurisdictional Boundaries

ABSTRACT

This contribution is a revision of T1.256 that harmonizes the GDMO and CORBA/IDL interfaces.

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FOREWORD

(This foreword is not part of the American National Standard.)

This American National Standard is part of a series of standards needed to specify the interfaces between pairs of Operations Systems (OS) across jurisdictional boundaries. This standard specifies the interface for the Electronic Access Ordering Inquiry interface.

WORKING GROUP T1M1.5 of Committee T1 prepared this document. Suggestions for improvement of this standard will be welcome. They should be sent to the T1 Secretariat, c/o Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Telecommunications, T1. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time this standard was approved, the Accredited Standards Committee T1 had the following members:

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OPERATIONS ADMINISTRATION, MAINTENANCE, AND
PROVISIONING (OAM&P) - MODEL FOR INTERFACE
ACROSS JURISDICTIONAL BOUNDARIES TO SUPPORT
ELECTRONIC ACCESS SERVICE ORDERING: INQUIRY
FUNCTION

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1 Scope, Purpose and Field of Application

1.1 Scope

The scope of this standard is to develop an American National Standards Institute (ANSI) standard for the inquiry functions of the Electronic Access Ordering (EAO) process as defined by the Ordering and Billing Forum (OBF).

1.2 Purpose

This standard defines an information model using both the Guidelines for the Definition of Managed Objects (GDMO) and the Common Object Request Broker Architecture (CORBA) for the TMN X-interface to support the inquiry functions of the EAO process. This standard uses these interface specifications to allow inquiry information to be conveyed across an interactive interface. This standard allows access customers to inquire about location, service availability, and connecting facility assignment information independent of issuing an order for an access service.

1.3 Application

The model described in this standard defines management information to be exchanged for the inquiry function of EAO. The inquiry function, an interactive class of OAM&P applications, is supported in this standard by defining object classes, their properties, and their relationships. The application of this model is for the service level. The service level functions are documented in M.3400.

2 Normative References

The following standards and industry guidelines contain provisions that, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

2.1 American National Standards

ANSI T1.208: 1993, Operations, Administration, Maintenance, and Provisioning (OAM&P) - Upper-layer Protocols for Telecommunication Management Network (TMN) Interfaces between Operations Systems and Network Elements

ANSI T1.210: 1993, Telecommunications - Operations, Administration, Maintenance, and Provisioning (OAM&P) - Principles of Functions, Architectures, and Protocols for Telecommunications Management Network (TMN) Interfaces.

ANSI T1.224: 1992, Telecommunications – Operations, administration, maintenance, and provisioning (OAM&P) – Protocols for interfaces between operations systems in different jurisdictions

ANSI T1.227: 1995, Operations, Administrations, Maintenance and Provisioning (OAM&P) - Generic Network Model for Interfaces between Operations Systems across Jurisdictional Boundaries to Support Fault Management (Trouble Administration)

ANSI T1.233: 1993, Operations, Administration, Maintenance, and Provisioning (OAM&P) Security Framework for Telecommunications Management Network (TMN) Interfaces

ANSI T1.240: 1996, Operations, Administration, Maintenance, and Provisioning (OAM&P) - Generic Network Information Model for Interfaces between Operations Systems and Network Elements

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ANSI T1.243: 1996, Operations, Administration, Maintenance, and Provisioning (OAM&P) - Baseline Security Requirements for the Telecommunications Management Network (TMN)

ANSI T1.254: 1996, Application Based Security

2.2 Other Standards

Rec. M.3010: 1996, Principles for a Telecommunications Management Network

Rec. M.3100: 1995, Generic Network Information Model

Rec. M.3400: 1992, Maintenance: Telecommunications Management Network, TMN Management Functions

Rec. X.208: 1988, Specification of Abstract Syntax Notation One (ASN.1)

Rec. X.209: 1988, Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)

Rec. X.210: 1993, Information Technology - Open Systems Interconnection - Basic Reference Model; Conventions for the Definition of OSI Services

Rec. X.680: 1994, Information Technology - Abstract Syntax Notation One (ASN.1): Specification of Basic Notation

Rec. X.690: 1994, Information Technology - ASN.1 Encoding Rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER), and Distinguished Encoding Rules (DER)

ISO/IEC IS 8824-1.3, Information Technology - Abstract Syntax Notation One (ASN.1) - Rules of Extensibility

Rec. X.701 | ISO/IEC 10040: 1992, Information Technology - Open System Interconnection - System Management Overview

Rec. X.710 | ISO/IEC 9595: 1990, Information Technology - Open System Interconnection - Common Management Information Service Definitions

Rec. X.711 | ISO/IEC 9596-1: 1991, Information Technology - Open System Interconnection - Common Management Information Protocol - Part 1: Specification

Rec. X.720 | ISO/IEC 10165-1, Structure of Management Information - Management Information Model

Rec. X.721 | ISO/IEC 10165-2: 1992, Information Technology - Open System Interconnection - Structure of Management Information - Part 2: Definition of Management Information

Rec. X.722 | ISO/IEC 10165-4: 1992, Information Technology - Open System Interconnection - Structure of Management Information: Guidelines for the Definition of Managed Objects

Rec. X.730 | ISO/IEC 10164-1: 1992, Information Technology - Open System Interconnection - System Management - Part 1: Object Management Function

Rec. X.731 | ISO/IEC 10164-2, Information Technology - Open Systems Interconnection - Systems Management: State Management Function

Rec. X.734 | ISO/IEC 10164-5:c1992, Information Technology - Open System Interconnection - System Management - Part 5: Event Report Management Function

Rec. Q.811: 1997, Specifications of TMN Interface Protocols Q3 and X Interface; Lower Layer Protocol Profiles for the Q3 and X Interface

Rec. Q.812: 1997, Specifications of TMN Interface Protocols Q3 and X Interface; Upper Layer

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Protocol Profiles for the Q3 and X Interface

ISO/IEC 11183-1: 1992, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 1: Specification of ACSE, Presentation and Session Protocols for the use by ROSE and CMISE

ISO/IEC 11183-2: 1992, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 2: CMISE/ROSE for AOM12 - Enhanced Management Communications

ISO/IEC 11183-3: 1992, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 3: CMISE/ROSE for AOM12 - Basic Management Communications

The Common Object Request Broker Architecture and Specification, Revision 2.2, Object Management Group, February 1998.

Object Management Group, CORBA services, Common Object Services, Version 2.2, November, 1997.

Note: ITU-T Recommendations and ISO standards are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036. OMG specifications are available from the Object Management Group, 492 Old Connecticut Path, Framingham, MA 01701, U.S.A or from their web site at www.omg.org.

2.3 Other References

SR STS-000324, (Bellcore Special Report), Generic Data Dictionary

SR STS-471000, (Bellcore Special Report), Access Service Ordering Overview, Access Service Electronic Communications Ordering Guidelines, Industry Support Interface

SR STS-471050, (Bellcore Special Report), General Section for the Access Service Electronic Communications Ordering Guidelines, Industry Support Interface

SR STS-471051, (Bellcore Special Report), Location Inquiry Function

SR STS-471052, (Bellcore Special Report), Service Availability Function

SR STS-471053, (Bellcore Special Report), CFA Inquiry Function

Note: ATIS/OBF Documents can be ordered from Mike Nicols, OBF Manager, ATIS, 1200 G Street N.W., Suite 500, Washington, DC 20005. Phone (202) 434-8822. Mnichol@atis.org. A complete OBF document catalog and ordering form is available on the ATIS web site at: <http://www.atis.org/atis/clc/obf/obfdocs.htm>

3 Definitions

- agent:** As defined in ISO/IEC 10040, the System Management Overview.
- facility:** A facility is a DS1/DS3 service type between a customer-designated premise and a SWC where multiplexing is provided.
- service:** Any connection provided between two designated customer locations. There are several types of services: Common Language Facility (CLF), to an end-user premise (CLS), and from a customer premise to a switch or a node (CLS).
- jurisdiction:** Refers to the functional separation of telecommunications networks. A jurisdiction is one of the following four types:
- a) Local Exchange Carrier Network;
 - b) Interexchange Carrier Network;

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- c) End User Network;
- d) Some combination of the above.

manager: As defined in ISO/IEC 10040, the System Management Overview.

service provider: The service provider is anyone who offers a standard interface to allow network management across jurisdictions of telecommunications services (or resources) they provide. The service provider acts in the agent role.

end user: End user is the user of the service.

4 Acronyms

ASN.1	Abstract Syntax Notation One
CLLI™	Common Language™ Location Identification Code
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CORBA	Common Object Request Broker Architecture
EAO	Electronic Access Ordering
IDL	Interface Definition Language
MCS	Management Conformance Summary
MIDS	Management Information Definition Statement
MOCS	Managed Object Conformance Statement
MRCS	Management Relationship Conformance Statement
OAM&P	Operations, Administration, Maintenance & Provisioning
OBF	Ordering and Billing Forum
OSI	Open Systems Interconnection
TMN	Telecommunications Management Network

Note: Acronyms for OBF data elements used in this document are defined in ATIS/OBF documents.

™ Common Language is a registered trademark and CLLI is a trademark of Bell Communications Research, Inc.

5 Requirements Overview

The requirements for the Inquiry Functions have been summarized in the next sections from the process flow and requirements identified by OBF and documented in SR STS-471050, SR STS-471051, SR STS-471052, and SR STS-471053. The detailed information flows are defined in the OBF documents while the following subsections provide a brief overview of G1.0 through G3.0 of the inquiry process.

5.1 Business Level

5.1.1 Actor Roles

Since all the objects are service objects, the only actor is the Service Customer in these functions.

5.1.2 High Level Use Case

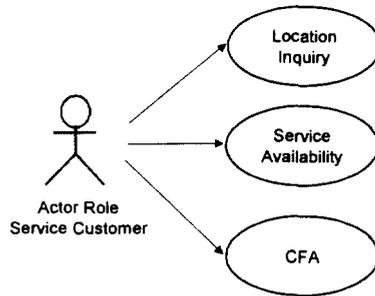


Figure 5.1 – High Level Use Case

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5.2 Location Inquiry Use Case

This function allows the customer to verify the address of the end user location or serving wire center to be used in the service order. Invalid addresses are one of the most prevalent causes of service order rejects in the current ASR batch process. In a location inquiry, the customer may send a request with one of the following parameters: end user address, circuit ID, or a CLLI Code. The provider should accept these parameters and provide a valid address (when there is an exact match) or multiple alternative addresses (when there is not an exact match). When there is not a match or if the information is restricted, the provider shall provide an appropriate error message.

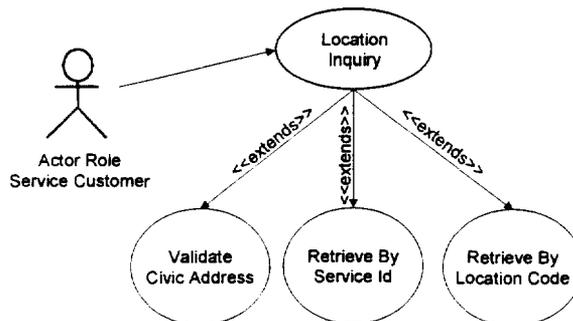


Figure 5.2 – Location Inquiry Use Case

5.2.1 Validate Civic Address

This specific operation allows the Actor to send a location inquiry request with the end user address as the input parameter. The provider should accept this parameter and provide the aforementioned output(s). The detailed data requirements and elements are found in the OBF documentation listed above.

5.2.2 Retrieve by Service ID

This specific operation allows the Actor to send a location inquiry request with the circuit ID as the input parameter. The provider should accept this parameter and provide the aforementioned output(s). The detailed data requirements and elements are found in the OBF documentation listed above.

5.2.3 Retrieve by Location Code

This specific operation allows the Actor to send a location inquiry request with the CLLI code as the input parameter. The provider should accept this parameter and provide the aforementioned output(s). The detailed data requirements and elements are found in the OBF documentation listed above.

5.3 Service Availability Inquiry

This function allows the customer to query and retrieve information from the provider as to whether a service is offered, whether it is offered between two specific locations and whether it is available by a requested date and for a requested quantity. If the requested service is not available by the requested date, the earliest alternative date may be returned as the service availability date. Inquiries for services are initiated using the combination of NC, NCI, SECNCI, and SPEC codes. The detailed data requirements and elements are found in the OBF documentation listed above.

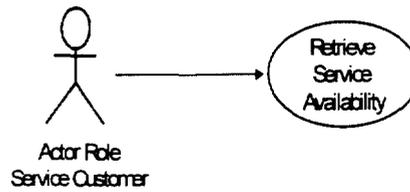


Figure 5.3 – Service Availability Inquiry Use Case

5.4 CFA Inquiry

A CFA is a channel within a customer leased connecting facility that extends from the customer’s ACTL to a SWC. Channels may be used to transport lower speed access services. For example, as illustrated in Figure 1 below, a DS3 facility will consist of 28 DS1 channels (CFAs), each of which may be used to provide a DS1 service from an ACTL to an End User Location or serving wire center.

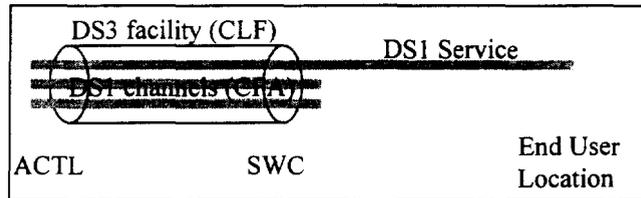


Figure 5.4 – CFA Example

This function allows the customer to retrieve a single or range of channel information for a valid facility from a provider. The channel(s) of a facility may be validated to determine a status of busy, spare or restricted. Channel information returned may include the CKR, ECCKT, and PON. The detailed data requirements and elements are found in the OBF documentation listed above.

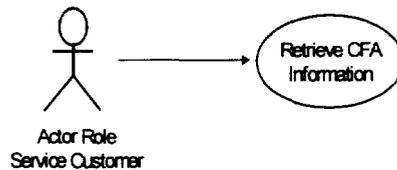


Figure 5.5 – CFA Inquiry Use Case

6 Analysis

The functions in this Standard support the Inquiry Functions of the EAO process which is the interactive data transfer of service information between providers and customers. This model pertains to the TMN X-interface supporting the Service Management Layer (defined in ITU-T M.3010).

6.1 Object Class Structure

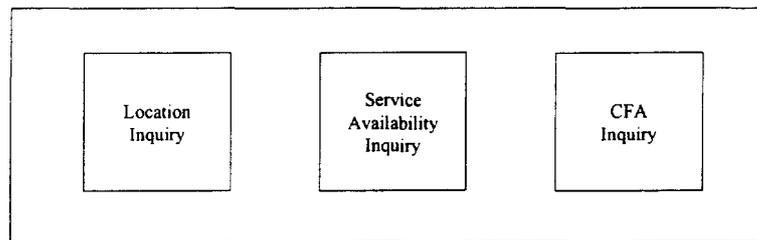


Figure 5.6 – Class Structure

6.2 Static Diagram

From a Service Customer perspective, service objects are always active with no state changes. Therefore, this is not applicable to this model.

6.3 Sequence Diagrams

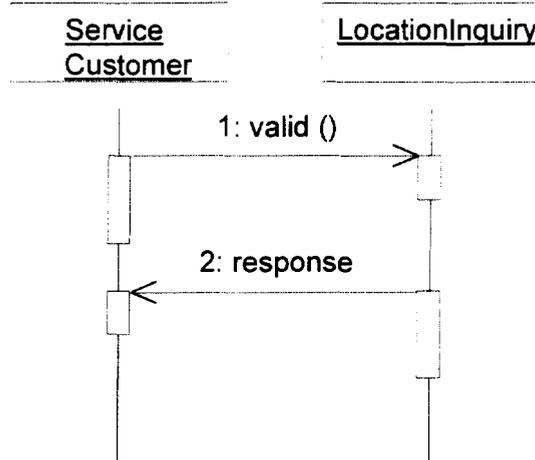
The following diagrams capture the information flow associated with each function.

6.3.1 Support of Location Inquiries

The LocationInquiry function supports the requirements for G1.0. This object allows a service customer to validate an address and retrieve detailed location information for that address, retrieve location information for a service, and retrieve location information for a location code. The LocationInquiry function satisfies the location inquiry requirements for both access and local ordering.

To support the requirements for G1.0, the LocationInquiry function supports the following operations:

6.3.1.1 Address Validation



validateCivicAddress

Validates an address.

Input:

Address

Output:

If an exact match for the Customer Premises Address is found, the reply of the *validateCivicAddress* may include the following:

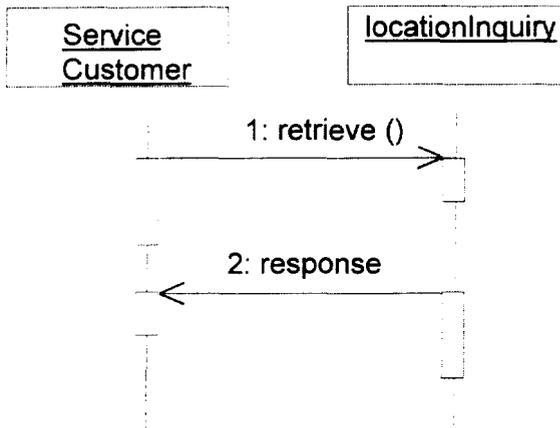
1. Customer Premises Address (optionally echoed back)
2. SWC CLLI code (optional)
3. Local Serving Office (LSO) (optional)

If an exact match for the Customer Premises Address is not found, the reply would be either a error the address was not found or a set of alternatives each of which may include:

1. Customer Premises Address
2. SWC (optional)
3. LSO (optional)

An implementor can set a limit to the number of alternatives that can be retrieved. If this limit is exceeded, the *maxAlternativesExceeded* error can be returned.

6.3.1.2 Retrieve By Service Id



retrieveByServiceId

Retrieves end user location information for a service (e.g., POTS, point-to-point circuit).

Input:

ECCKT or WTN

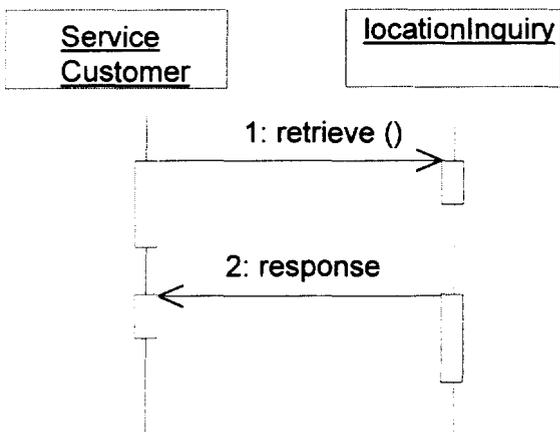
Output:

If the ECCKT is found and the customer has access to the ECCKT, the reply may include:

1. Customer Premise Address
2. SWC for the ECCKT (optional)
3. LSO for the ECCKT (optional)

If the ECCKT is not found, an error is returned indicating that the ECCKT was not found. If an ECCKT is sent and the customer does not have access to the ECCKT, an error is returned indicating that access is denied.

6.3.1.3 Retrieve by Location Code



retrieveByLocationCode

Retrieves location information for a location code

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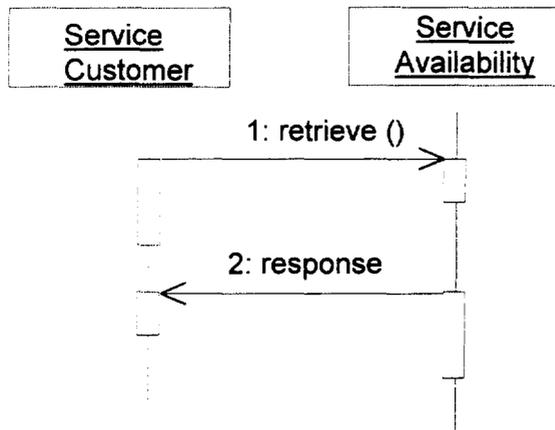
Input: Location Code

Output: If the location is found by the service provider, the reply may include:

1. Address of the location
2. LSO for the location (optional).

If the location code is not found, a error indicating the location was not found is returned.

6.3.2 Support of Service Availability Inquiries



The ServiceAvailability function supports the requirements of G 2.0. This function allows a service customer to inquire about the availability of a service. The ServiceAvailability function has the following operation:

retrieveAvailability

Retrieves availability information for service.

Input:

Service information which includes:

1. NC
2. NCI
3. PIU
4. SECNCI
5. SPEC
6. Locations
7. Quantity
8. Availability Date

The first two characters of the NC in the request must be valid for the provider. Position one and two must be alphanumeric characters (no special characters or wild cards). Position three and four may be wild card characters.

Output:

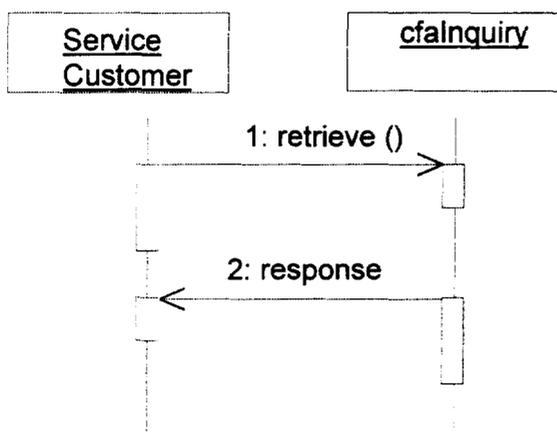
If the desired service is available, the reply will indicate so.

If either or both locations are invalid, the provider will return an error indicating the invalid location(s). If an exact match for the service is not found and alternatives do not exist or not supported, an error will be returned indicating so. If an exact match is not found and alternatives do exist with the same PIU as the request (if present), the reply will specify the alternatives which may include:

1. NC, NCI, SECNCI, SPEC and optionally PIU for the alternative service (which could be the same if the desired location, quantity and date were not available).
2. Quantity (optional)
3. Locations (optional)
4. Available Date (optional)

An implementor can set a limit to the number of alternatives that can be retrieved. If this limit is exceeded, the maxAlternativesExceeded error can be returned as an error response.

6.3.3 Support of CFA Inquiries



The CfaInquiry function supports the requirements of G 3.0. This function allows a service customer to retrieve channel information for a facility. The CfaInquiry function has the following operation:

retrieveChannelInformation Retrieves channel information for a facility.

Input: CLF and, optionally, the channels to retrieve information for (default is all channels)

Output: If the facility is found and the customer has access to the facility, the reply will include the following for each channel:

1. channel number
2. channel status defined as either:
 - (a) spare - available for assignment
 - (b) assigned - working service found on channel requested. The assigned channel information may include the following:
 - (i) serviceId (ECCKT),

- (ii) serviceAliasList (CKT)
- (c) pending - working service found on the channel and pending order activity to change the channel. The pending channel information may include:
 - (i) activity type,
 - (ii) serviceId (ECCKT),
 - (iii) due date, PON, and
 - (iv) serviceAliasList (CKT).
- (d) Restricted - access to information on this channel is denied.
- (e) Invalid - channel number out of range.

This information may be provided in the response on a channel by channel basis. For multiple channels whose status is spare or Invalid, a set or a range of channels could be returned with a single status (e.g., channels 5-12: spare; channels 29, 31, 33: invalid). An additional information field is also provided in the response for any other comments or error messages associated with the request. If some of the channels are out of range, the list of the out of range channels can be returned in additionalText field of ChannelInfoReply as being out of range.

If the CFA is not found the reply will be an error stating so. When a customer inquires about a facility, and the customer does not have authorized access to the entire facility or certain requested channels on the facility, the provider would send back an "access denied" error. Two types of access denied responses are defined separately for the facility level and the channel level.

7 CORBA/IDL Interface

7.1 Interfaces

This CORBA/IDL model is a synchronous interface. The call-back interface provides pseudo-asynchronous application messaging.

While the model is not constricted by the number of interface instances, it is suggested that the interfaces supported by the service provider be service objects. That is, only one instance of each interface provides the service for a particular implementation. The single instance is called repetitively by the service customer to satisfy inquiries which may be unrelated.

7.2 Naming

The following table suggests service names for those implementations wishing to use the CORBA Naming Service as defined in Object Management Group, *CORBA services, Common Object Services*, November, 1997. The names listed below could be bound to the object references of the interface within some NamingContext:

Interface	Service Name
LocationInquiry	"LocationInquiry"
ServiceAvailability	"ServiceAvailability"
CfaInquiry	"CfaInquiry"

Interface	Service Name
LocationInquiryByCallBack	"LocationInquiryByCallBack"
ServiceAvailabilityByCallBack	"ServiceAvailabilityByCallBack"
CfaInquiryByCallBack	"CfaInquiryByCallBack"

7.2.1 Synchronous Interfaces

This CORBA/IDL model includes an interface for each of the EAO inquiry functions.

LocationInquiry

The LocationInquiry interface allows a service customer to validate an address and retrieve detailed location information for that address, retrieve location information for a service, and retrieve location information for a location code. This interface satisfies the location inquiry requirements for both access and local ordering.

validateCivicAddress

To validate an address the service customer invokes the validateCivicAddress operation on the LocationInquiry interface.

```

Status validateCivicAddress(
    in Base::InquiryId_t inquiryId,
    in LocationTypes::CivicAddress_t address,
    inout EaoTypes::CustomerInformationOpt_t custInfo,
    inout TimeTypes::DateTimeOpt_t dateAndTimeSent,
    out EaoTypes::LocationFoundReplyList_t locationInfoList,
    out boolean maxAlternativesExceeded
)
raises (
    Base::NotFound,
    Base::AccessDenied,
    Base::MissingData,
    Base::InvalidData,
    Base::ProcessingFailureError,
);
    
```

Parameters:

- inquiryId A unique identifier for this invocation (used for auditing purposes).
- address The address to validate and to retrieve location information for.
- custInfo Information about the customer making the request.
- dateAndTimeSent Upon invocation, the date and time the inquiry was initiated. After invocation, the date and time the reply was sent.

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locationInfoList	A list of detailed location information. If an exact match was found for the address, this parameter will contain a single entry. If an exact match for the address was not found, this parameter will contain a list of close alternative addresses.
maxAlternativesExceeded	An exact match for the address was not found and the list of alternatives exceeds the maximum for the implementation. The operation must be invoked with more detailed information in the address parameter.

Return Values:

Status	A value of ExactMatch means that an exact match for address parameter was found and the locationInfoList parameter will be empty. A value of AlternativesExist means that an exact match for the address parameter could not be found, but the locationInfoList parameter contains alternative address(es) that are close matches. A value of AdditionalBuildingOrFloorRequired means that the building or floor information was incomplete. A list of alternative address(es) that closely match may be returned in the locationInfoList.
--------	--

Exceptions:

NotFound	No exact or close match was found for the address.
AccessDenied	The address is restricted, so detailed information cannot be returned.
MissingData	Required information was missing from the input parameters.
InvalidData	The input parameters contain invalid data.
ProcessingFailureError	A system-related error (e.g., system timed out, resources exceeded) occurred during processing.

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retrieveByServiceId

To retrieve end user location information for a service (e.g., POTS, point-to-point circuit), the service customer invokes the `retrieveByServiceId` operation on the `LocationInquiry` interface.

```
void retrieveByServiceId(  
    in    Base::InquiryId_t          inquiryId,  
    in    ServiceTypes::ServiceId_t  serviceId,  
    inout EaoTypes::CustomerInformationOpt_t  custInfo,  
    inout TimeTypes::DateTimeOpt_t    dateAndTimeSent,  
    out   EaoTypes::LocationFoundReply_t    locationInfo  
)  
raises (  
    Base::NotFound,  
    Base::AccessDenied,  
    Base::MissingData,  
    Base::InvalidData,  
    Base::ProcessingFailureError  
);
```

Parameters:

<code>inquiryId</code>	A unique identifier for this invocation (used for auditing purposes).
<code>serviceId</code>	The identifier for the service.
<code>custInfo</code>	Information about the customer making the request.
<code>dateAndTimeSent</code>	Upon invocation, the date and time the inquiry was initiated. After invocation, the date and time the reply was sent.
<code>locationInfo</code>	Detailed location information for the end user of the service.

Return Values:

NONE

Exceptions:

<code>NotFound</code>	The <code>serviceId</code> does not identify a known service.
<code>AccessDenied</code>	The service customer is not authorized to retrieve information for this service.
<code>MissingData</code>	Required information was missing from the input parameters.
<code>InvalidData</code>	The input parameters contain invalid data.
<code>ProcessingFailureError</code>	A system-related error (e.g., system timed out, resources exceeded) occurred during processing.

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retrieveByLocationCode

To retrieve end user location information for a location code, the service customer invokes the retrieveByLocationCode operation on the LocationInquiry interface.

```

void retrieveByLocationCode(
    in    Base::InquiryId_t          inquiryId,
    in    LocationTypes::LocationCode_t locationCode,
    inout EaoTypes::CustomerInformationOpt_t custInfo,
    inout TimeTypes::DateTimeOpt_t    dateAndTimeSent,
    out   EaoTypes::LocationFoundReply_t locationInfo
)
raises (
    Base::NotFound,
    Base::AccessDenied,
    Base::MissingData,
    Base::InvalidData,
    Base::ProcessingFailureError
);
    
```

Parameters:

inquiryId	A unique identifier for this invocation (used for auditing purposes).
locationCode	The locationCode used to retrieve the location information.
custInfo	Information about the customer making the request.
dateAndTimeSent	Upon invocation, the date and time the inquiry was initiated. After invocation, the date and time the reply was sent.
locationInfo	Detailed location information.

Return Values:

NONE

Exceptions:

NotFound	The locationCode does not identify a known location.
AccessDenied	The location is restricted, so detailed information cannot be returned.
MissingData	Required information was missing from the input parameters.
InvalidData	The input parameters contain invalid data.
ProcessingFailureError	A system-related error (e.g., system timed out, resources exceeded) occurred during processing.

ServiceAvailability

The ServiceAvailability interface allows a service customer to inquire about the availability of a service.

retrieveAvailability

To retrieve service availability information, the service customer invokes the retrieveAvailability operation on the ServiceAvailability interface.

```

Status retrieveAvailability(
    in Base::InquiryId_t inquiryId,
    in EaoTypes::ServiceAvailabilityRequest_t request,
    inout EaoTypes::CustomerInformationOpt_t custInfo,
    inout TimeTypes::DateTimeOpt_t dateAndTimeSent,
    out EaoTypes::ServiceAlternativesListOpt_t alternatives,
    out Base::StringOpt_t additionalInformation,
    out boolean maxAlternativesExceeded
)
raises (
    EaoTypes::LocationNotFound,
    EaoTypes::ServiceDefinitionNotFound,
    EaoTypes::InvalidAvailabilityDate,
    Base::MissingData,
    Base::AccessDenied,
    Base::InvalidData,
    Base::ProcessingFailureError
);
    
```

Parameters:

inquiryId	A unique identifier for this invocation (used for auditing purposes).
request	Includes the service information whose availability is being retrieved. The service information includes either the code or name of the service, the percent interstate usage, the locations for the service, the quantity, and the desired in-service date.
alternatives	If the return code is AlternativesAvailable, this parameter will contain a list of alternatives for the requested service request.
additionalInformation	Additional information concerning the service request or alternatives that the service provider wishes to relay to the service customer.
maxAlternativesExceeded	An exact match for the service definition was not found and the list of alternatives exceeds the maximum for the implementation.

Return Values:

Available	The service is available.
NotAvailable	The service is not available and no alternatives exist.
AlternativesAvailable	The requested service is not available but alternatives exists.

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Exceptions:

LocationNotFound	One of the locations was not found to be valid in the service provider's area.
ServiceDefinitionNotFound	The service definition and no alternatives were found.
NotFound	No exact or close match was found for the service definition.
AccessDenied	The address is restricted, so detailed information cannot be returned.
MissingData	Required information was missing from the input parameters.
InvalidData	The input parameters contain invalid data.
ProcessingFailureError	A system-related error (e.g., system timed out, resources exceeded) occurred during processing.

CfaInquiry

The CfaInquiry interface allows a service customer to retrieve channel information for a facility.

retrieveChannelInformation

To retrieve channel information, the service customer invokes the retrieveChannelInformation operation on the CfaInquiry interface.

```
void retrieveChannelInformation(  
    in Base::InquiryId_t          inquiryId,  
    in EaoTypes::ChannelInfoRequest_t channelInfoRequest,  
    inout EaoTypes::CustomerInformationOpt_t custInfo,  
    inout TimeTypes::DateTimeOpt_t dateAndTimeSent,  
    out EaoTypes::ChannelInfoReply_t channelInformation  
)  
raises (  
    Base::NotFound,  
    Base::AccessDenied,  
    Base::MissingData,  
    Base::InvalidData,  
    Base::ProcessingFailureError  
)
```

Parameters:

inquiryId	A unique identifier for this invocation (used for auditing purposes).
channelInfoRequest	Specifies the facility and the channels for which information is to be retrieved. If the channels are not included, information for all channels will be returned.
channelInformation	Information such as the availability, pending order information, and assigned service information of the channels requested.

Return Values:

NONE

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Exceptions:

NotFound	The facility was not found.
AccessDenied	The service customer is not authorized to view channel information on the requested facility.
MissingData	Required information was missing from the input parameters.
InvalidData	The input parameters contain invalid data.
ProcessingFailureError	A system-related error (e.g., system timed out, resources exceeded) occurred during processing.

7.2.2 Call-back Interfaces

The call-back interfaces are functionally equivalent to the synchronous interfaces except that each operation on the synchronous interface is split into two operations on two separate interfaces in the call-back interfaces.

The first operation is on the interface receiving requests. The interface is implemented by the service provider. The operation takes the input parameters of the operation on the synchronous interface and, optionally, a reference to a call-back object (the call-back is optional to reduce the overhead for those implementations with a single call-back instance). The only exception that can be thrown from this operation is a ProcessingFailureError to indicate that the request could not be received. It is expected that the implementation of this operation do as little processing as possible before returning control to the caller.

The second operation is on the call-back interface. This interface is implemented by the service customer. The operation takes the output parameters of the operation on the synchronous interface. In cases where lists are the only parameter, a completed flag is added as a parameter. The completed flag allows the service provider to send partial information back to the service customer by setting the flag to FALSE. When all responses have been sent, the service provider sets the completed flag to TRUE.

The call-back interfaces also include an operation for each exception on the synchronous interface. If the service provider needs to send an error in response to a request, the appropriate exception operation on the call-back interface is called.

This model makes no assumptions on the number of call-back instances a particular implementation creates. This decision does not impact either the interface or the service provider implement and is completely up to the service customer's discretion.

7.3 IDL Modules

7.3.1 EaoInq Module

```
#ifndef _EaoInq_idl_
#define _EaoInq_idl_

#include <EaoTypes.idl>

#pragma prefix "T1.256"

//=====
//
// EAO: Interfaces for Electronic Access Ordering (EAO)
// Inquiry Functions
//
//=====
```