# Accredited Standards Committee X3, INFORMATION PROCESSING SYSTEMS

**X3S3.3/92-229**
**1 June, 1992**

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To: X3S3.3

From: D. Marlow

Re: NWI proposal for multicast extensions to the connectionless-mode Network service definition (ISO 8348 Addendum 1)

NSWC has prepared this working draft of an Amendment to the Network service definition to provide a connectionless-mode service. This is a proposed update to the SC6 N 7084 that was discussed at the interim SC6 meeting in Paris.

The U.S. submitted an NWI proposal (ANSI X3S3.3/92-148 and X3S3/92-045) for extensions to the Network service definition to support multicast transfer. Enclosed is a proposed technical contribution to the SC6 July 1992 meeting in San Diego to support this NWI.

An issue was raised at the April meeting of X3S3.3 as to whether the SC6 N 7084 changes were consistent with the present draft of CCITT Recommendation X.213. New material is included to show how the latest draft of the CCITT Recommendation X.213 (X3S3.3/91-353) can be provided with connectionless-mode multicast capability. No problem is anticipated in working the connectionless-mode multicast into either ISO 8348 Addendum 1 or CCITT Recommendation X.213

U.S. discussion on this input is planned for the ANSI X3S3.3 committee's June 1992 meeting in Raleigh, North Carolina.

## Preface

This Amendment is one component of a number of standardization actions on-going to support an OSI connectionless-mode multicast capability. Additional proposals are on-going to provide additions to the connectionless-mode Transport protocol, the connectionless-mode Network Layer Protocol, the ES-IS routeing protocol as well as the Network layer addressing addendum of the same standard that this Amendment covers.

Included as Annex A is the equivalent set of changes to incorporate these multicast extensions into the present draft of CCITT Recommendation X.213. No problems were encountered in providing these changes to the new CCITT working document.

Date: 1992-06-01

# Information processing systems - Data communications - Network service definition

## Amendment X: Addition of connectionless-mode multicast services

## Introduction

This Amendment to ISO 8348 provides additions to the connectionless-mode transmission service definition in order to support multicast PDU transfer. The connectionless-mode transmission service is contained in ISO 8348 Addendum 1.

ISO 8348 Addendum 1 restricts the connectionless-mode transmission to the case of exchanging NSDUs between one sending NS user and one receiving NS user. Subnetwork standards exist which support the transfer of a SDU from one entity to a number of other entities in a single logical operation. With the current ISO 8348 Addendum 1, no Network layer services are described to utilize such multicast capabilities. While the capability of a subnetwork to directly support multicast is advantageous to the utility of the multicast networking service, this is not a requirement for the multicast services provided here.

This Amendment defines "connectionless-mode multicast transfer network services" and the functions related to it, which may be provided by the Network Layer of the of the OSI Reference Model. It adds to the concepts and principles defined in ISO 8348; it does not modify them.

## 0. ISO 8348 Addendum 1 - Introduction

***Add a section prior to 0.3 within clause 0 of ISO 8348 Addendum 1 with the following text (no other changes to clause 0 of ISO 8348 Addendum 1):***

0.2.3 Multicast transfer

Connectionless-mode transmission can deliver a unit of data from one Network entity to one or more Network entities by the performance of a single service access. In order to support the sending of a unit to multiple Network entities, the Network service providers must support the optional features of OSI Connectionless-mode Multicast and the destination address used must be a group address.

## 1. Scope and field of application

***This Amendment makes no changes to clause 1 of ISO 8348 Addendum 1.***

## 2. References

***This Amendment makes no changes to clause 2 of ISO 8348 Addendum 1.***

## 3. Definitions

***This Amendment makes no changes to clause 3 of ISO 8348 Addendum 1.***

## 4. Abbreviations

***This Amendment makes no changes to clause 4 of ISO 8348 Addendum 1.***

## 5. Conventions

***This Amendment makes no changes to clause 5 of ISO 8348 Addendum 1.***

## 6. Overview and general characteristics

***This Amendment makes no changes to clause 6 of ISO 8348 Addendum 1.***

## 7. Features of the Network Service

***Add to section 7 point (i) after the words "destination NSAP":***

or group of destination NSAPs

## 8. Classes of Network Service

***This Amendment makes no changes to clause 8 of ISO 8348 Addendum 1.***

## 9. Model of the Network Service

***Change the second to the last paragraph, first sentence of 9.1, from "to both NS users" to:***

to all NS users

***Change the second paragraph, end of the first sentence of 9.3 from "a given pair of NSAPs." to***

a given pair of NSAPs or a sending NSAP and a group of receiving NSAPs

***Change the third paragraph (following the first note) of 9.3 from ", as provided between any two NSAPs, can be modelled in the abstract as an a priori association between the two NSAPS" to:***

, as provided between any two NSAPs or a sending NSAP and a group of receiving NSAPs can be modelled in the abstract as an *a priori* association between the NSAPs involved,

***Change Figure 3 to Figure 3a. Change the reference in the fourth paragraph (following the second note) of 9.3 from figure 3 to figure 3a. Add to the end of this paragraph the following sentences:***

In Figure 3b, USER X represents the NS user that passes objects to the NS provider. USERS Y, Z and others represent the NS users that accept multicast objects from the NS provider.

***Change the sixth paragraph (beginning "However, with ...) of 9.3 from "between a pair of NSAPs," to:***

between a pair of NSAPs or a sending NSAP and a group of receiving NSAPs

## 10. Quality of Network Service

***Change the second paragraph, first sentence of 10 from "between a pair of NSAPs." to:***

between a pair of NSAPs or a sending NSAP and a group of receiving NSAPs

***Change the end of the first paragraph, last sentence of 10.3.1 from "intended receiving NS user." to:***

intended receiving NS user or all receiving NS users in the case of multicast transfer.

## 11. Section two: Definition of connection-mode primitives

***This amendment makes no additions or changes to clauses 11 through 14 of ISO 8348.***

## 15. UNITDATA

***Retitle section 15: "Connectionless-mode Primitives"***

***Retitle section 15.1: "UNITDATA" and change within the first sentence of 15.1 from "to another network-service-access-point" to:***

to another network-service-access-point or a group of network-service-access-points

***Change the third paragraph, first sentence of 15.1 from "any specific pair of NSAPs." to:***

any specific pair of NSAPs or a specific sending NSAP and a specific group of receiving NSAPs.

***Add the following paragraph to the end of 15.2:***

Two optional primitives are defined for those NS users and providers which implement the OSI Connectionless Multicast capabilities. The N-JOIN-GROUP.request primitive provides a means for the NS user to register with the NS provider to receive specific multicast NSDUs. The multicast NSDU requested is identified by the destination address of the NSDU matching the destination address passed as a parameter of this primitive. This primitive notifies the NS provider of a request which may involve actions of Network layer routeing protocols. The NS provider upon being issued this primitive will attempt to obtain the multicast PDUs as defined in the parameters of this primitive, but there is no guarantee that the provider will actually receive such PDUs for passing on to the requesting NS user. The N-LEAVE-GROUP.request primitive in a like way provides the NS user the capability to terminate the reception of specific multicast NSDUs. After issuing an N-LEAVE-GROUP.request primitive for specific multicast NSDUs, it is still possible for the NS user to receive N-UNITDATA.Indications for these specific multicast NSDUs for a short undefined period of time

***Change Table 15 to add two new optional Primitives (N-JOIN-GROUP.Request and N-LEAVE-GROUP.Request) and one new parameter (Receive scope). The N-JOIN-GROUP request has two mandatory parameters (Destination address and Receive scope) and the N-LEAVE-GROUP has one mandatory parameter (Destination Address).***

***Add to the end of 15.2.1 a new sentence:***

For multicast transfer, the destination address must be a group NSAP address.

***Add a new section and an editor's note after 15.2.3, increment the numbering of section 15.2.4 and 15.2.5:***

15.2.4 Receive scope

This parameter informs the NS provider of any scope limitations (as opposed to the global networking address domain) for the multicast PDUs the NS user requests to receive. For example the NS user may request PDUs available on a single subnetwork or all subnetworks within his own area.

*Editor's Note:*

*The Receive scope parameter is being investigated as a means of passing information to a NS provider on how far away to look for specific multicast NSDUs. It is felt at this time that a NS user may know whether the NSDUs are very local (perhaps originated on a common subnetwork) or of global interest (perhaps originated anywhere in the global network addressing domain). Further work is needed to specify this parameter.*

***Replace the present paragraph 15.2.4 with:***

The sequence of primitives in a non-multicast network-connectionless-mode transmission is defined in the network service primitive time sequence diagram, see figure 20. The sequence of primitives in multicast network-connectionless-mode transmission is defined in the network service multicast primitive time sequence diagrams, see figure XX. The N-UNITDATA.Indications for the multicast transmission case arrive in an arbitrary order that is not simultaneous and in addition there is no deterministic ordering of N-UNITDATA.Indications arriving at any particular receiving NSAP resulting from separate N-UNITDATA.Requests.

## A. Annex

***Replace in three parts of the Annex (second paragraph in A.1, first paragraph in A.2 and the second paragraph of A.4.2) the words "pair of NSAPs" with:***

pair of NSAPs or a sending NSAP and a group of receiving NSAPs

***Add to the end of A.5.1:***

For multicast transfer, the destination address must be a group NSAP address.

**Figures**

Add the following two figures

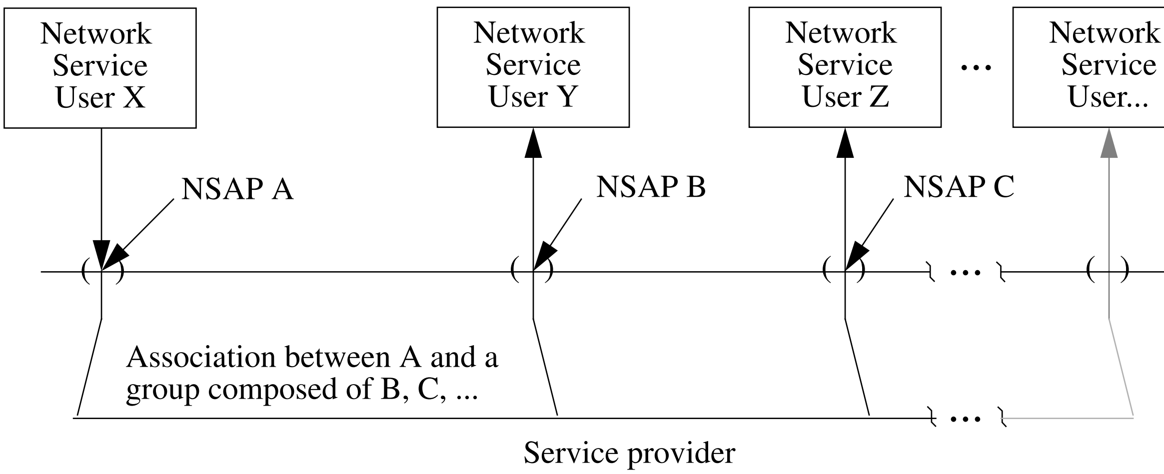
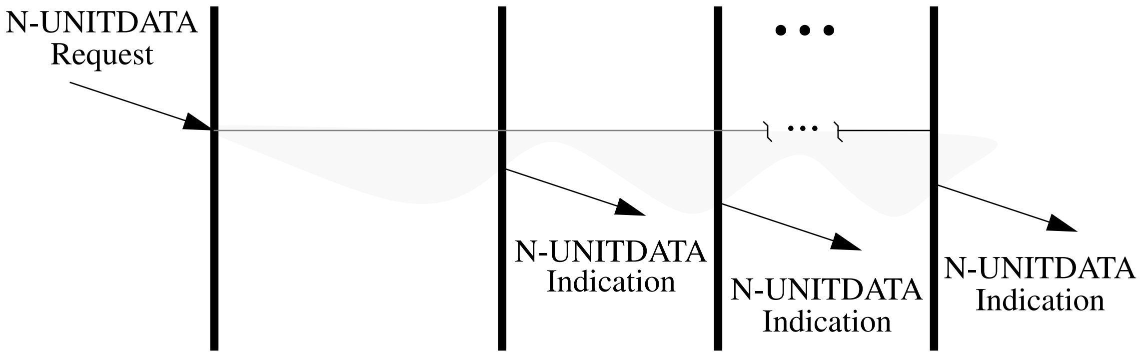



Figure 3b -- Model of a multicast network-connectionless-mode transmission




Sequence of primitives in a multicast network-connectionless-mode transmission
(a)


N-JOIN-GROUP Primitive
(b)

N-LEAVE-GROUP Primitive
(c)

Multicast Primitives

Figure XX

# Annex A

Date: 1992-06-01

# Proposed changes to: the current Recommendation X.213 draft

## Amendment X: Addition of connectionless-mode multicast services

## Introduction

This Amendment to CCITT Recommendation X.213 provides additions to the connectionless-mode transmission service definition in order to support multicast PDU transfer. The connectionless-mode transmission service is contained in CCITT Recommendation X.213, Part 3.

CCITT Recommendation X.213 restricts the connectionless-mode transmission to the case of exchanging NSDUs between one sending NS user and one receiving NS user. Subnetwork standards exist which support the transfer of a SDU from one entity to a number of other entities in a single logical operation. With the current CCITT Recommendation X.213, no Network layer services are described to utilize such multicast capabilities. While the capability of a subnetwork to directly support multicast is advantageous to the utility of the multicast networking service, this is not a requirement for the multicast services provided here.

This Amendment defines "connectionless-mode multicast transfer network services" and the functions related to it, which may be provided by the Network Layer of the of the OSI Reference Model. It adds to the concepts and principles defined in CCITT Recommendation X.213; it does not modify them.

## 1. Scope and field of application

***This Amendment makes no changes to clause 1 of CCITT Recommendation X.213.***

## 2. References

***This Amendment makes no changes to clause 2 of CCITT Recommendation X.213.***

## 3. Definitions

***Add a definition as 3.3.7 within clause 3 of CCITT Recommendation X.213 with the following text (no other changes to clause 3 of CCITT Recommendation X.213):***

3.3.7 Network connectionless-mode multicast transfer

Connectionless-mode transmission can deliver a unit of data from one Network entity to one or more Network entities by the performance of a single service access. In order to support the sending of a unit to multiple Network entities, the Network service providers must support the optional features of OSI Connectionless-mode Multicast and the destination address used must be a group address.

# 4. Abbreviations

***This Amendment makes no changes to clause 4 of CCITT Recommendation X.213.***

# 5. Conventions

***This Amendment makes no changes to clause 5 of CCITT Recommendation X.213.***

# 6. Overview and general characteristics

***This Amendment makes no changes to clause 6 of CCITT Recommendation X.213.***

# 7. Classes and types of Network Service

***This Amendment makes no changes to clause 7 of CCITT Recommendation X.213.***

# 8. PART 2 - DEFINITION OF CONNECTION-MODE SERVICE

***This Amendment makes no changes to clauses 8 through 14 of CCITT Recommendation X.213.***

# 15 Model of the Network Service

***Add to section 15 point (a) after the words "destination NSAP":***

or group of destination NSAPs

## 16. Model of the connectionless-mode Network Service

***Change the first paragraph, end of the second sentence of 16.1, from "two NSAPs." to:***

different NSAPs.

***Change the second paragraph, first sentence of 16.1, from "to both NS users" to:***

to all NS users

***Change the second paragraph, end of the first sentence of 16.2 from "a given pair of NSAPs." to***

a given pair of NSAPs or a sending NSAP and a group of receiving NSAPs

***Change the third paragraph (following the first note) of 16.2 from ", as provided between any two NSAPs, can be modelled in the abstract as an a priori association between the two NSAPS" to:***

, as provided between any two NSAPs or a sending NSAP and a group of receiving NSAPs can be modelled in the abstract as an *a priori* association between the NSAPs involved,

***Change Figure 20 to Figure 20a. Change the reference in the fourth paragraph (following the second note) of 16.2 from figure 20 to figure 20a. Add to the end of this paragraph the following sentences:***

In Figure 20b, USER X represents the NS user that passes objects to the NS provider. USERS Y, Z and others represent the NS users that accept multicast objects from the NS provider.

***Change the fifth paragraph (beginning "However, with ...) of 16.2 from "between a pair of NSAPs," to:***

between a pair of NSAPs or a sending NSAP and a group of receiving NSAPs

## 17. Quality of connectionless-mode Network Service

***Change the first paragraph, first sentence of 17. from "between a pair of NSAPs." to:***

between a pair of NSAPs or a sending NSAP and a group of receiving NSAPs

***Change the end of the first paragraph, last sentence of 17.2.1 from "intended receiving NS user." to:***

intended receiving NS user or all receiving NS users in the case of multicast transfer.

## 18. Sequence of connectionless-mode primitives at one NSAP

***Replace the present clause 18 with:***

The sequence of primitives in a non-multicast network-connectionless-mode transmission is defined in the network service primitive time sequence diagram, see figure 21. The sequence of primitives in multicast network-connectionless-mode transmission is defined in the network service multicast primitive time sequence diagrams, see figure 22. The N-UNITDATA.Indications for the multicast transmission case arrive in an arbitrary order that is not simultaneous and in addition there is no deterministic ordering of N-UNITDATA.Indications arriving at any particular receiving NSAP resulting from separate N-UNITDATA.Requests.

## 19. UNITDATA

***Retitle section 19: "Connectionless-mode Primitives"***

***Retitle section 19.1: "UNITDATA" and change within the first sentence of 19.1 from "to another network-service-access-point" to:***

to another network-service-access-point or a group of network-service-access-points

***Change the third paragraph, first sentence of 19.1 from "any specific pair of NSAPs." to:***

any specific pair of NSAPs or a specific sending NSAP and a specific group of receiving NSAPs.

***Add the following paragraph to the end of 19.2:***

Two optional primitives are defined for those NS users and providers which implement the OSI Connectionless Multicast capabilities. The N-JOIN-GROUP.request primitive provides a means for the NS user to register with the NS provider to receive specific multicast NSDUs. The multicast NSDU requested is identified by the destination address of the NSDU matching the destination address passed as a parameter of this primitive. This primitive notifies the NS provider of a request which may involve actions of Network layer routeing protocols. The NS provider upon being issued this primitive will attempt to obtain the multicast PDUs as defined in the parameters of this primitive, but there is no guarantee that the provider will actually receive such PDUs for passing on to the requesting NS user. The N-LEAVE-GROUP.request primitive in a like way provides the NS user the capability to terminate the reception of specific multicast NSDUs. After issuing an N-LEAVE-GROUP.request primitive for specific multicast NSDUs, it is still possible for the NS user to receive N-UNITDATA.Indications for these specific multicast NSDUs for a short undefined period of time

***Change Table 17 to add two new optional Primitives (N-JOIN-GROUP.Request and N-LEAVE-GROUP.Request) and one new parameter (Receive scope). The N-JOIN-GROUP request has two mandatory parameters (Destination address and Receive scope) and the N-LEAVE-GROUP has one mandatory parameter (Destination Address).***

***Add to the end of 19.2.1 a new sentence:***

For multicast transfer, the destination address must be a group NSAP address.

***Add a new section and an editor's note after 19.2.3***

19.2.4 Receive scope

This parameter informs the NS provider of any scope limitations (as opposed to the global networking address domain) for the multicast PDUs the NS user requests to receive. For example the NS user may request PDUs available on a single subnetwork or all subnetworks within his own area.

*Editor's Note:*

*The Receive scope parameter is being investigated as a means of passing information to a NS provider on how far away to look for specific multicast NSDUs. It is felt at this time that a NS user may know whether the NSDUs are very local (perhaps originated on a common subnetwork) or of global interest (perhaps originated anywhere in the global network addressing domain). Further work is needed to specify this parameter.*

**Figures**

Add the following two figures

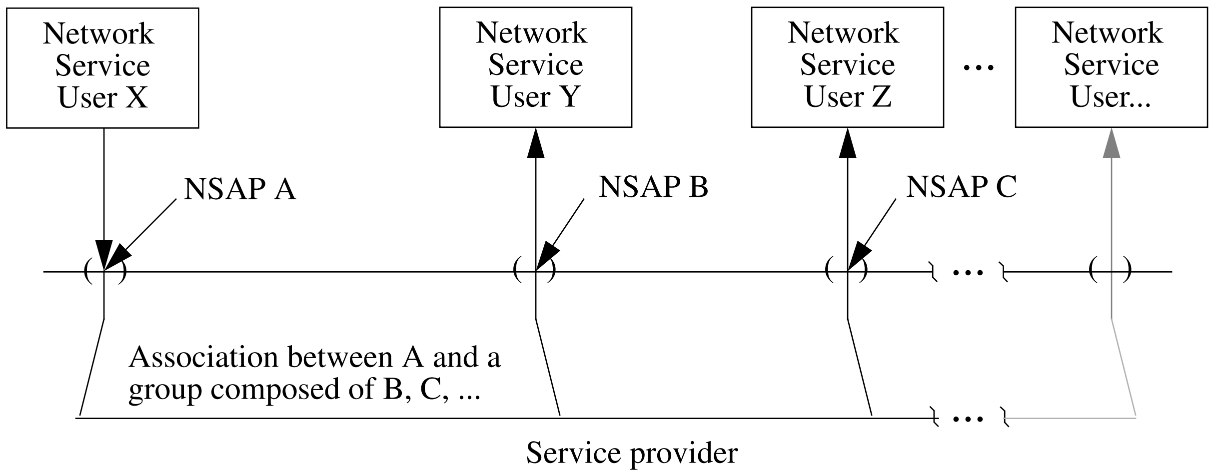
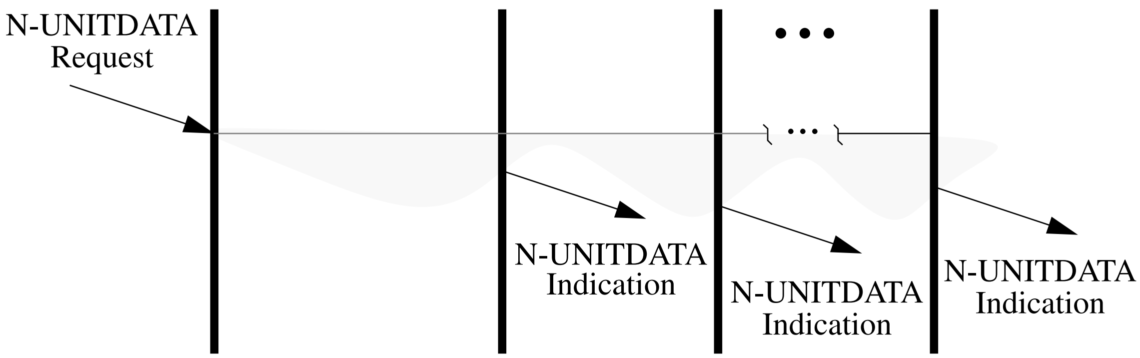
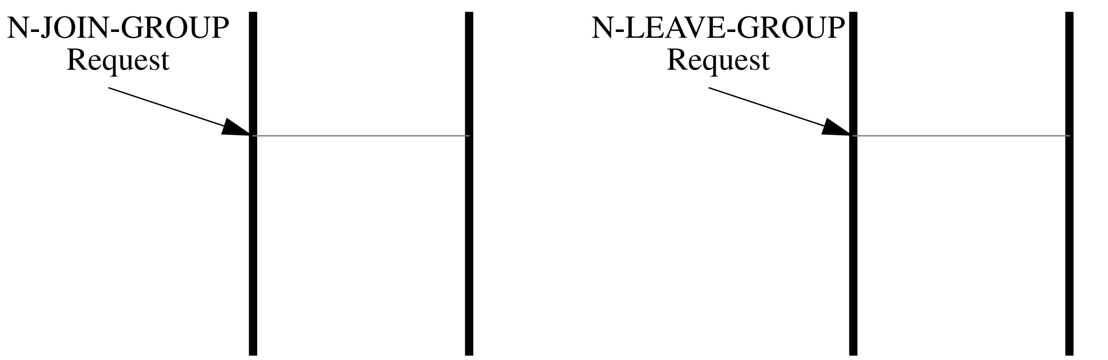



Figure 20b -- Model of a multicast network-connectionless-mode transmission




Sequence of primitives in a multicast network-connectionless-mode transmission
(a)




N-JOIN-GROUP Primitive
(b)

N-LEAVE-GROUP Primitive
(c)

Multicast Primitives

Figure 22