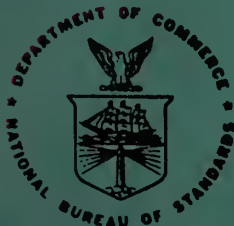NBSIR 83-2717

Proceedings of the Second LAN-Transport Workshop

Report of the Second Workshop for Local Area Network
Implementors of the NBS Specifications of the
International Standards Organization Transport
Class 4 Protocol

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
Institute for Computer Sciences and Technology
Systems and Network Architecture Division
Washington, DC 20234

May 1983

U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

NBSIR 83-2717

PROCEEDINGS OF THE SECOND LAN-TRANSPORT WORKSHOP

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ABSTRACT

The National Bureau of Standards, Institute for Computer Sciences and Technology (ICST) has prepared specifications for the International Organization for Standardization's (ISO) Class 4 Transport Protocol. At the request of a number of companies, ICST organized a second workshop for local area network implementors of these specifications. The second workshop focused on 1) token bus local area networks and 2) file transfer applications to be run at a multi-vendor demonstration in the 1984 time frame. This report documents the second workshop and records implementation choices and agreements made by the participants.

Keywords: communication protocols; computer networks; local area networks; transport protocol.

SUMMARY

This report documents the second workshop for local area network implementors of the ICST specification for the International Standards Organization (ISO) Transport Class 4 Protocol on IEEE 802 compatible local area networks. The workshop, held by ICST to continue the progress made at the first workshop, assembled 51 attendees from 28 organizations. The second workshop provided a forum for vendors and user organization's to select appropriate applications to demonstrate the capabilities of transport and local area network protocol implementations that adhere to the standards cited above. The workshop also allowed the attendees to resolve issues not fully decided at the first workshop.

The second workshop resulted in several agreements. Two neutral sites will be established to allow demonstrations of multi-vendor implementations of the ISO Transport Class 4 and IEEE 802 local area network standards. One site will be hosted by General Motors (GM). The GM test bed will support the IEEE 802.4 (token bus) local area network standard. The second site will be hosted by ICST. The ICST test bed will support the IEEE 802.3 (CSMA/CD) local area network standard.

Vendors participating in the multi-vendor demonstations will implement a subset of the present ISO file-transfer protocol (FTP) services. A later workshop dealing solely with the FTP will agree on the details of a protocol specification.

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8:45 a.m.   Introduction and Opening Remarks

Mr. Robert Blanc, ICST, welcomed the attendees to the
meeting and introduced the workshop chairman, Mr. Maris
Graube.

Mr. Graube began the workshop with a review of the minutes
from the previous workshop. Two changes to the minutes
were adopted, as follows:

1)   Page 12   Replace consensus portion of the
                         Sequence Number issue with the following
                         statement:

                         "Participants will implement a 31-
                         bit sequence space negotiable to a
                         7-bit sequence space for ISO compatibility."

2)   Page 16   Second paragraph (TSAP-ID). Replace
                         the second sentence beginning "The
                         participants agreed..." with the following
                         sentence.

                         "It was agreed that there would be
                         individually assigned TSAP identifiers
                         published by vendors."

No further comments were received and the minutes from
the first LAN/Transport workshop were approved as amended.

9:15 a.m.   Ford Motor Company Presentation

Mr. Shaun Devlin, Research Staff at Ford, gave a presentation
describing Ford's progress and needs in the areas of computer-
assisted design (CAD) and computer-assisted manufacturing
(CAM). Presently, Ford is emphasizing CAD with some transfer
of data to the CAM process. No one vendor meets all of
Ford's CAD/CAM needs; therefore, it is imperative that
a set of protocol standards that support open systems interconnection
evolve to allow communication in a multi-vendor environment.

Mr. Devlin described Ford's need for intra-office, intra-campus,
inter-city, cross-country, and international data communication.
He described Ford's minimum application needs to include
file transfer and remote login. He also outlined his view
of Ford's five year plan to achieve the required communications
and applications.

Finally, Mr. Devlin proposed the Ford research laboratory
as a neutral site for the multi-vendor demonstration being

planned at this workshop. He could provide access to a CSMA/CD
local-area network and could also guarentee that there would
be no production pressures at the site. The pilot applications
proposed were IGES testing and analytical fluid flow design
of manifolds.

9:45 a.m.   General Motors Presentation

Mr. Ron Floyd, Manufacturing Automation Protocol (MAP)
project at General Motors, gave a presentation describing
GM's progress and needs in achieving the automated factory.
Mr. Floyd described a GM plant as islands of automation
that must communicate. The problems in achieving that
communication include: abundance of custom hardware
and software; copious cabling; and difficulty in expanding
communications. Mr. Floyd stated that 50% of the cost
of new process control systems is related to communication.

GM began the MAP project to eliminate an overabundance
of cabling and terminals by using a standard communication
technology based upon the ISO Reference Model. For layers
one and two, the MAP project has chosen broadband token
bus technology (IEEE 802.4). For the upper layers, the project
will use ISO and NBS protocols. Specifically, internet with
a null header will be used until the standard is mature; class
4 transport will be used; and a custom session protocol will
be used until a session standard is mature.

GM believes that the key ingredients to success of the MAP
concept are: 1) National/International Standards and 2) multi-
vendor support. The medium range goals of the project include:
1) a virtual terminal protocol, 2) a file transfer protocol,
3) directory services, and 4) network management. The
long range goal of the project is the factory of the future.

Mr. Floyd closed his presentation with the GM proposal for
a multi-vendor demonstration at the 1984 NCC. GM proposes
that two LANs be operated at the show (CSMA/CD and token
bus). The transport protocol over both LANs would be NBS/ISO
class 4 transport. The application would include a subset
of the ISO file transfer protocol (FTP) and a simple process
monitoring application that includes the GM programmable
controllers.

General Motors is committed to coordinate testing for those
vendors implementing transport on an IEEE 802 token bus
network. A proposed schedule was provided (see attachment).
GM will pursue a booth at the 1984 NCC.

10:40 a.m.   IBM Formal Statement

Mr. James Quigley of IBM followed the GM presentation
with a formal statement of support for the GM proposal
(see attachment).

10:40 a.m.	ICL Statement

Mr. J. R. Cadwallader, ICL, stated that European vendors are interested in Ethernet. In fact, there is a show tentatively planned for September 1983 in Europe to interconnect multi-vendor products using Ethernet and the ECMA 72 transport (i.e., class 4).

11:10 a.m.	File Transfer Protocol Description

Mr. James Moulton, ICST, described the current state of the ISO FTP. He presented the two-party model and the ISO FTP services. He closed the presentation with a description of an approximate finite state machine for FTP.

Dr. John Heafner, ICST, proposed that NBS host a series of smaller workshops to define a protocol based upon a subset of ISO FTP services. The NBS could develop a protocol specification for the selected services in a timely fashion. Dr. Heafner said that his proposal would only be effective if a subset of FTP services is agreed upon at the present meeting.

11:30-12:30 a.m.	FTP Service Discussion

The attendees spent the hour preceding lunch discussing the FTP services required for the multi-vendor demonstration. A vote was taken to determine the interest in FTP for the demonstration. The results of the vote were as follows:

Use Abbreviated ISO FTP	29
Use a Vendor-Specific FTP	0
Use a Specially Created FTP	1

Some discussion was held concerning the possibility of other applications for the demonstration. The other applications mentioned included: 1) FTP of NAPLPS data, 2) teletex, 3) simple messaging terminal-to-terminal, 4) directory of demonstration participant status, and 5) status polling of programmable numerical controllers.

Prior to breaking for lunch, Mr. Cadwallader, ICL, stated that ICL and several other European companies are prepared to participate in a booth or booths at the 1984 NCC.

1:30 p.m.	Application Decision

Mr. Graube opened the afternoon session of the workshop with a summary of the discussion that was held prior to lunch. The applications were divided into two categories: 1) general interest and 2) special interest. The only application in the general interest category was FTP. This application would require general agreement on the protocol specifics.

The applications in the special interest category included:
1) NAPLPS, 2) messaging, 3) teletex, and 4) polling of programmable
controllers. It was decided that those vendors specifically
interested in any of these applications can coordinate the
details among themselves.

It was proposed that NBS make a first draft of an FTP specification
reflecting a selected subset of ISO FTP services. This draft
specification would be circulated by mail in preparation for
a meeting July 18 and 19, 1983, in Snowbird, Utah. Meeting
arrangements were to be made by Mr. Graube.

2:15 p.m.   ICST Test Procedures

Mr. Jerry Linn, ICST, presented a description of the ICST
co-operative testing program. He also described the test
tools available to support that program. Mr. Linn invited
participants to tour the ICST test facilities and see some
of the test tools in operation. The tour was given after dinner
(7:30 - 8:30 p.m.).

3:45 p.m.   ICST Multi-Vendor Demonstration Participation

Mr. Kevin Mills, ICST, announced that ICST was interested
in participating in the multi-vendor demonstration and would
build a real-time transport protocol performance measurement
system. The system will passively monitor all traffic on
the LAN; consume link, network, and transport headers;
generate raw transport traffic/performance measures; and
produce informative graphic displays reflecting transport
traffic on the LAN.

The tool being constructed will find use beyond the demonstration.
The measurement system can support both on-line and off-
line experiments as well as ad hoc measurement. This tool
will compliment the current set of test tools developed by
ICST to support protocol testing.

4:25 p.m.   NCC Discussion

Mr. Graube initiated a discussion that would determine whether
the 1984 NCC is the show that the participants wished to
attend. This discussion was not completed before the workshop
adjourned the first day's business at 5:00 p.m.

MINUTES

May 6, 1983

8:45 a.m.   Selection of Subset of ISO FTP Services

The participants continued the discussion of ISO FTP services that are needed for the multi-vendor demonstration. The following services were selected:

> F-CONNECT
> F-DISCONNECT
> F-ABORT
> F-SELECT
> F-DESELECT
> F-OPEN
> F-CLOSE
> F-READ
> F-READ-END
> F-DATA
> F-DATA-END
> F-WRITE
> F-CREATE

NBS will build a protocol specification reflecting this subset of ISO FTP services. The protocol specification will be discussed at the July FTP workshop where the services may be reduced further. Interested participants signed a roster so that the specification could be mailed to them. The roster is attached to these minutes.

9:30 a.m.   Discussion of Demonstration Site

Mr. Graube led a discussion of the appropriate forum and specific site for the multi-vendor demonstration. The following possibilities were considered.

1.   Trade Show Demonstration.
2.   Demonstration at a neutral site.
3.   Holding a dedicated trade show.

Several organizations volunteered to host a neutral site demonstration, including: 1) General Motors (limited in size and limited to token bus LAN), 2) Ford, 3) National Bureau of Standards, 4) Mitre, 5) Boeing Computer Services, and 6) Industrial Technology Institute.

After lengthy discussion of the pros and cons of the various options, Mr. Graube put the issues to a vote. The vote concerned the appropriate forum for the demonstration. The results are shown below.

Forum	Votes
1. 1984 NCC	7
2. Neutral Site Demo	13
3. Own Show	6

It became clear from this vote and the discussion that every participant believed a neutral site demonstration is a prerequisite to any trade show.

The second vote taken was to determine the number of organizations interested in each of the two LAN technologies under consideration for the demonstration. The results are shown below.

	LAN Technology	Votes
1.	CSMA/CD (IEEE 802.3)	9
2.	Token Bus (IEEE 802.4)	4

This vote indicated that substantial interest existed in both technologies. In order to document the interest of the various organizations represented, two rosters were circulated. One roster was for those participants interested in participating in a CSMA/CD LAN for the demonstration. The second roster was for those participants interested in participating in a token bus LAN for the demonstration. The rosters are attached to these minutes.

10:15 a.m.   Commitments

Having determined the interests of the participants, Mr. Graube now moved toward gaining commitments to support the demonstrations. The following significant events occurred during this discussion.

1.   General Motors committed to provide a neutral site for a token bus demonstration and to coordinate testing in support of the demonstration.

2.   Mr. Anthony Lauck, DEC, requested that NBS provide a neutral site for a CSMA/CD demonstration and that NBS coordinate testing in support of the demonstration. NBS agreed to accept such responsibility.

3.   General Motors stated that they will pursue a booth at the 1984 NCC and move a demonstration from the neutral site to the NCC.

4.   The participants interested in the CSMA/CD demonstration expressed interest only to a neutral site demonstration. Mr. Graube stressed that commitment to the 1984 NCC must be made within two months if it is to be made.

5.	General Motors will run the token bus demonstration. They plan to have the neutral site demonstration for June of 1984.

6.	NBS will organize the CSMA/CD demonstration. This demonstration is also planned for 1984.

7.	Common booth space is being arranged for the 1984 NCC. Anyone interested should contact ICST (Mr. Bob Blanc) to make reservations. The deadline is May 31, 1983.

8.	Any organization wishing to acquire a tape of transport protocol test tools should send a letter to:

> Mr. R. J. Linn
> Institute for Computer
> Sciences and Technology
> Building 225, Room B212
> National Bureau of Standards
> Washington, D. C. 20234

9.	Tentative time schedules were established. For token bus, see the attached GM proposed schedule. For the CSMA/CD, the following schedule was proposed.

May 83 – Aug 83	Telenet Testing
Sept 83 – Apr 84	CSMA/CD Testing
Apr 84 – June 84	Set up Multi-Vendor Demonstartion
June 84	Run Multi-Vendor Demonstration

11:00 a.m.   TSAP-ID

The technical issue of TSAP-ID was not completely resolved at the first workshop; therefore, time was spent to reach an agreement. Dr. Ken Turner, ICL, presented the work that ECMA had done in the area of TSAP-ID. The participants then discussed the various options and reached agreement on the following TSAP-ID conventions for use in the multi-vendor demonstrations.
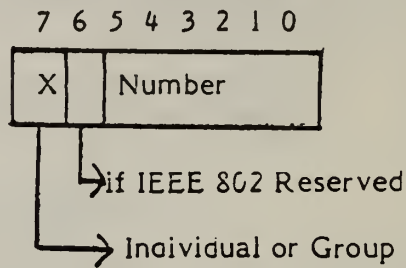
TSAP-ID(Hex)	Application
00FF	File Transfer
00FE	File Transfer of NAPLPS
00FD	Programmable Controller Applications
00FC	Messaging

The TSAP-ID is a sixteen bit number for the multi-vendor demonstrations.
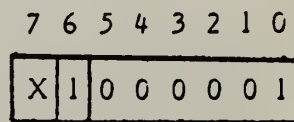
11:30   LSAP-ID

At the first LAN/Transport workshop, a proposal was made that the IEEE 802 committee assign an LSAP-ID to represent class 4 transport. This was accomplished and Mr. Andy Luque, Tektronix, gave a report on the result. The LSAP is an 8-bit number mapped as follows.

```
   7 6 5 4 3 2 1 0
  ┌───┬─────────────┐
  │ X │   Number    │
  └───┴─────────────┘
       └──→ if IEEE 802 Reserved
   └──────→ Individual or Group
```

The LSAP assigned to class 4 transport is as follows.

```
   7 6 5 4 3 2 1 0
  ┌─┬─┬───────────┐
  │X│1│0 0 0 0 0 1│
  └─┴─┴───────────┘
```

This translates to 41 (hex). (Note: This assumes bit number 7 above is masked to zero.)

11:45 a.m.   Next LAN/Transport Workshop

The next LAN/Transport workshop was tentatively scheduled for October 27-28, 1983, in Washington, D. C.

12:00 Noon   Adjournment

It was agreed that the minutes of the workshop should be published and circulated as soon as possible. The workshop was then adjourned.
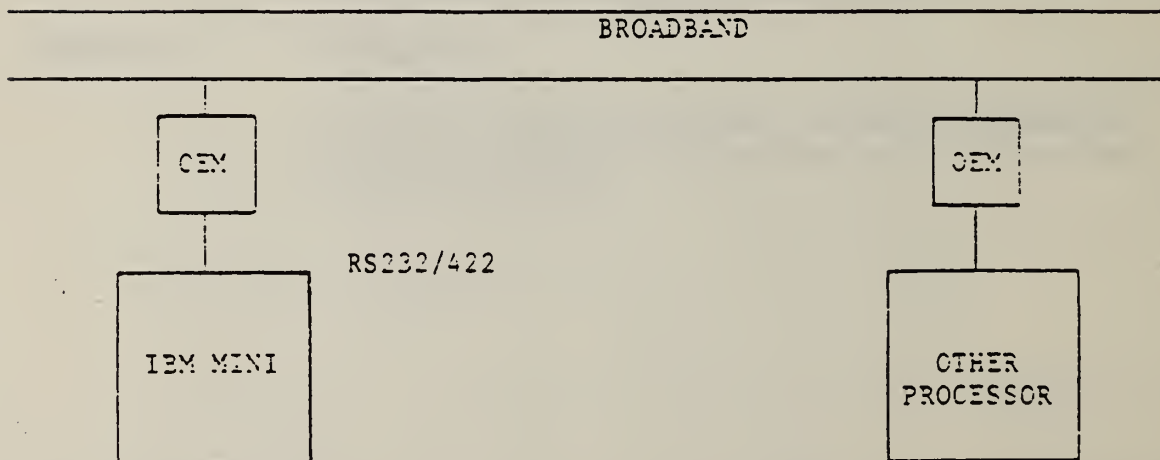
PROPOSED SCHEDULE

MAY 83   DRAFT INTERFACE SPECIFICATION (CPU TO 802 MODEM) AVAILABLE
          FOR COMMENT.

JUNE 83   INTERFACE SPEC PUBLISHED BY GM

JUNE 83   MULTI VENDOR WORKSHOP
          DEFINE 802 TEST CASES
          DEFINE FTP SUBSET PROTOCOL (DRAFT)

AUG 83   INSTALL TESTBED MODEMS AT GM

SEPT 83   TESTBED OPERATION OF MODEMS AGAINST DEFINED TEST PROCEDURES
          ACCEPTANCE TEST BY GM

OCT-DEC 83   CPU VENDOR EQUIPMENT INTERFACE TESTING AT GM SITE

OCT 83   MULTI VENDOR FTP WORKSHOP (FOLLOW-UP TO JUNE MEETING)

NOV 83   FINAL FTP SPECIFICATION PUBLISHED BY GM OR NBS

JAN-APR 84   TRANSPORT/FTP TESTING AT GM (INDIVIDUAL TESTING)

APR-JUN 84 MULTI-VENDOR FTP AND DEMO TESTING AT GM

JUN 84   MOVE HARDWARE TO NCC
          INSTALLATION AND TESTING PRIOR TO SHOW (1-2 WEEKS)

JULY 9-12   1984 NATIONAL COMPUTER CONFERENCE

IBM RESPONSE TO GM REQUEST
FOR SUPPORT OF A MULTI-VENDOR
LOCAL AREA NETWORKING DEMONSTRATION

"IBM is pleased to participate in the General Motors'
proposed demonstration at the NCC in 1984. The IBM
computer implementing NBS transport software will
utilize RS232 or RS422 to attach to a GM specified
third party interface product which will provide
a broadband token bus access protocol.

The IBM open system would be a special feasibility
demonstration built on one of our computers. IBM's
support of the NBS demo should not be considered a
commitment to provide any product offering at any
point in the future."

BROADBAND

```
        OEM                              OEM

              RS232/422


      IBM MINI                         OTHER
                                      PROCESSOR
```

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Meeting in Snow Bird, Utah

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10. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)*

The National Bureau of Standards, Institute for Computer Sciences and Technology (ICST) has prepared specifications for the International Organization for Standardization's (ISO) Class 4 Transport Protocol At the request of a number of companies, ICST organized a second workshop for local area network implementors of these specifications. The second workshop focused on 1) token bus local area networks and 2) file transfer applications to be run at a multi-vendor demonstration in the 1984 timeframe. This report documents the second workshop and records implementation choices and agreements made by the participants.

12. KEY WORDS *(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)*

communication protocols; computer networks; local area networks; transport protocols.

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