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OSI95

The OSI95 Transport Service with Multimedia support

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OSI95 Contributions to ISO/IEC and ETSI

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OSI95 Contributions to ISO/IEC and ETSI

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This paper summarizes the activities that were carried out within the standardization bodies ISO/IEC and ETSI during the two-year period of the OSI95 project. However it focuses mainly on the OSI95 contributions.
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1 Activities within ISO/IEC JTC1/SC6

The Sub-Committee 6 (SC6) of the Joint Technical Committee 1 (JTC1) of ISO/IEC is responsible for the four lower layers of the OSI Reference Model (RM) of ISO ([ISO 7498]). It is composed of several Working Groups (WG). In the sequel we will essentially report our contributions within the WG4 (responsible for the Transport Layer of the OSI RM) and within the newly created ECFF activity. ECFF stands for "Enhanced Communications Functions and Facilities for OSI lower layers". It is a joint activity of several WGs of SC6 dealing with new services and protocols for the lower layers. Its creation during the two-year period of OSI95 results from the acceptation by SC6 of a New Project (NP) on this topic. This will be further detailed in the sequel.

The University of Liège (ULg) attended four SC6 meetings: Berlin (July 1991), Paris (February 1992), San Diego (July 1992) and London (February 1993). The University of Lancaster attended the Paris and London meetings, and Bull, the Paris meeting.

1.1 The Berlin Meeting

At the WG4 meeting in Berlin, ULg presented a contribution ([ISO 4N695]) in which the need for new high speed transport service and protocol was emphasized. This was substantiated by referring to the OSI95 project whose main objectives were presented.

This presentation generated a lot of interest in WG4. Among them, the US representatives tried to see how far our proposal was different from their proposal of 8 NWIs that they were going to present ([ISO 6N6618]) and whose titles are listed hereafter:

- Enhanced Transport Mechanisms Guidelines,
- Additional Data link Layer Service Functions,
- Additional Data link Layer Protocol Functions and Procedures

- Additional Network Layer Service Functions,
- Additional Network Layer Protocol Functions and Procedures
- Additional Transport Layer Service Functions,
- Additional Transport Layer Protocol Functions and Procedures
- Group NSAP addressing

At the plenary session of SC6 two NP (New Project) proposals were finally accepted and were proposed to JTC1 for a three-month ballot:

- Enhanced transport mechanism guidelines ([ISO 1N1515])
- Group NSAP addressing (for multicast operation) ([ISO 1N1514])

The first one was aligned with the OSI95 proposal.

These two NPs were accepted, so that the first success criterion of OSI95 was achieved. Note however that three countries had cast a negative vote on these proposals: UK, Canada and Germany.

1.2 The Paris Meeting

This is during this meeting that the ECFF term was defined as the new title of the first accepted NP.

During the resolution of comments on the two accepted NPs, it already appeared clearly that some countries (mainly Canada and Japan) were against any new design of OSI service or protocol unless they were justified by clear application requirements and were "compatible" with existing OSI services and protocols. It was proposed that the base text of the ECFF NP reflect a top-down approach which favours a clear identification of requirements coming from the applications prior to any proposal for the addition of new facilities or functions in the existing standards. More precisely, the following 4-step procedure was accepted:

1. Identification of application requirements that have implications for the OSI lower layer services and protocols
2. The examination of existing OSI lower layer services and protocols to determine if the requirements identified in (1) can be met by existing or pending OSI standards
3. In those cases in which requirements cannot be met by existing or pending OSI standards, the consideration of proposals for modification/extension of existing OSI services and protocols
4. In those cases in which neither of the approaches outlined in (2) and (3) is sufficient to satisfy identified requirements, the consideration of proposals for new services and/or protocol.

The OSI95 contribution from Lancaster ([ISO P19]) dealing with application requirements was adapted and included in the draft base text of the ECFF NP ([ISO 6N7068]). From then on, this text was also referred to as the "ECFF guidelines" document.

The US and ULg (via the Belgian National Body: IBN) also input contributions on the transport layer ([ISO 6N7070, ISO 6N7312]). In [ISO 6N7312] we gave some general considerations on the design of new transport service and protocol.

1.3 The San Diego Meeting

The first draft of the ECFF guidelines document [ISO 6N7309] was highly criticized. A new structure was set up with several editors responsible for specific parts of the document. ULg was appointed editor for the section on Quality of Service (QoS).

Besides the guidelines, several contributions focused on specific lower layers.

As regards the transport layer, the US National Body (ANSI) proposed HSTS ([ISO SD4.026]), based on XTP [PEI XTP], where several transport service types are defined. ANSI also submitted another transport service definition ([ISO 6N7445]) which was a multipeer extension of the Connection-mode Transport Service ([ISO 8072]). The corresponding two protocols, HSTP and TP5, were submitted as experts contributions ([ISO 6N7429]). HSTP is based on the transport sub-protocol of XTP. TP5 is a multipeer version of TP4. The US Delegation was obviously divided into these two groups. The second group, say the TP5 group, seemed to limit the objective of the new transport service and protocol to the multipeer issue and tries to foster a simple enhancement of TP4. On the other hand, the first group, say the XTP group, was against that approach because they feared that another important ECFF issue, viz. the performance, would not be taken into account.

ULg submitted, via the Belgian National Body (IBN), a second OSI95 contribution ([ISO 6N7323]) in which several types of transport services were presented informally and in LOTOS. Finally, ULg submitted a third document ([ISO 6N7759]) which focused on one of these service types: the Connection-mode Transport Service of OSI95. An important contribution of this paper was dealing with enhanced QoS semantics and negotiation.

A liaison was also established between SC21 and SC6 on QoS ([ISO 6N7788]). SC21 started an NP on QoS, and SC6 will be in a position to contribute to this project in the context of ECFF.

1.4 The London Meeting

The second draft of the ECFF guidelines document ([ISO 6N7788]) was again criticized by several National Bodies that found it mainly too superficial and also inadequate for preparing specific new project proposals (NPs) on ECFF. It was decided at the end of the meeting not to request a new version of this guidelines document.

On the other hand, for the first time since the beginning of the ECFF activity, important technical discussions took place on all the possible enhancements of the transport service: QoS, multipeer, fast connect, graceful release, out-of-band, request-response service and acknowledged connectionless-mode service. We summarize the main contributions hereafter.

1.4.1 QoS

The main contribution was from ULg on QoS enhancement of OSI95 ([ISO 4L19]). It generated many discussions and was considered as very relevant for the future work on ECFF. It was decided that SC6 will circulate this document for comments to its members (Annex A of [ISO 6N7989]) and to SC21 ([ISO 6N8010]) via the already

existing liaison on QoS. SC21 has indeed started working on a QoS Framework to be considered in a future version of the OSI Reference Model. Our OSI95 contributions might be included in the draft text of this framework.

1.4.2 Multipeer

The main contributions on multipeer were from US experts and French experts. There are two proposals from US experts: the multicast stream of HSTS ([ISO 6/4N806]) and another more ambitious multicast connection-mode service with an Active Group Integrity (AGI) concept, as discussed in [ISO 6N7445]. The French ETS [ISO 6N7883] also includes multicast, but goes beyond the classical 1 → N connection, and considers also other multipeer connections like N → 1 or N → N. The US also proposed amendments to the connectionless-mode transport service and protocol ([6/4N807, 6/4N808]).

1.4.3 Fast Connect

The main contributions were from US experts and CCITT. Some US experts support a fast connect facility as described in HSTS ([ISO 6/4N806]). CCITT has expressed the need for improving the OSI efficiency ([ISO 6N7856]) and has also considered the fast connect as a way to do so. However CCITT would prefer a simpler solution which consists in allowing a larger data field in the CONNECT.request primitives in all OSI layers.

1.4.4 Graceful Release

The main contribution was from OSI95 by ULg ([ISO 6/4N821, ISO 6/4N822]). We argued in favour of this facility because it enhances the reliability of the connection and also improves the efficiency of the connection release. It was decided that SC6 will circulate to its members excerpts from these documents for comments (Annex F of [ISO 6N7989]).

1.4.5 Out-of-band

The main contribution was also from OSI95 by ULg ([ISO 6/4N821, ISO 6/4N822]). The term out-of-band, as defined therein, was criticized by some experts who found it completely misleading. According to them, what we have defined is in fact an in-band facility because the TSDUs which are transferred that way are associated with a connection. An out-of-band TSDU transfer, they say, is by definition completely independent of any connection. If so, then other Transport Service types may be used for this purpose without having to define such an 'out-of-band' facility. After the CCITT representative pointed out that the terms 'in-band' and 'out-of-band signalling' have always been used with confusion, the convener proposed to give to this new facility a temporary neutral name: the ABC_service. It was decided that SC6 will circulate to its members excerpts from these documents for comments (Annex E of [ISO 6N7989]).

1.4.6 Request-Response Service

The main contributions were from US experts and from OSI95 by ULg. US experts proposed a request-response service type in their HSTS ([ISO 6/4N806]), and ULg proposed another one in OSI95 ([ISO 6/4N821]). They are roughly the same but in OSI95, we do not use transaction_ids in primitive parameters: association endpoints are better suited for this purpose. It was decided that SC6 will circulate to its members excerpts from these documents for comments (Annex D of [ISO 6N7989]).

1.4.7 Acknowledged Connectionless-mode Service

The main contributions were from OSI95 by ULg ([ISO 6/4N821]) and French experts in ETS ([ISO 6N7883]). The main discussion was on the difference between the semantics of the confirmation primitive in this service and the confirmation primitive in the request-response service. Having defined both services in OSI95, we explained the difference between these semantics, and we argued that both services may be useful. It was decided that SC6 will circulate to its members excerpts from these documents for comments (Annex B of [ISO 6N7989]).

1.4.8 Other Discussions

In addition to ULg's contributions, Lancaster presented the results of their evaluation of the OSI95 transport service ([6/4N823]).

The following NPs on transport layer enhancements were proposed, but rejected during the meeting since unanimity was required:

- Three variants of an NP on the connection-mode transport service: the first one proposed an amendment to ISO 8072 to add new service facilities; the second one proposed a completely different standard; and the third one proposed an amendment to ISO 8072 to add only multicast.
- One NP on the connection-mode transport protocol.
- Two NPs on multicast extensions of the connectionless transport service and protocol.

An NP on a new transport protocol was considered premature. And some National Bodies (e.g. Japan, Germany, UK) stated that issuing NPs on the transport service was also premature, and that more technical discussions were needed.

It is not excluded however that a National Body will make another NP proposal for ballot before the next SC6 meeting in Seoul (October 93).

1.5 Conclusion

The London Meeting has clearly shown a change of attitude of delegations which, in the past meetings, were very reluctant to see the progression of the ECFF work.

It seems that most of the delegations that were attending the London meeting are ready to move to a new project on at least an Enhanced Transport Service Definition.

If such a new project is approved before the Seoul meeting it seems reasonable to believe that many sessions in Seoul may be devoted to in-depth discussions of the various facilities that have been already tackled in London.

The problem of an Enhanced Transport Protocol seems to be less mature, many delegations believing that it would be better to work for a while on the Transport Service Definition before beginning to work on the Transport Protocol.

It is worth mentioning that the WG1 of SC21, being responsible for the maintenance of the OSI RM, also plays an important role in two matters: the QoS framework and the multipeer communications. As regards QoS the SC21 framework might benefit from our work. It is too early to draw conclusions on this liaison. As regards multipeer SC21 might re-activate its project.

1.6 Other ISO/IEC Activities

The work on the LOTOS methodology and its related specification of the ISO transport protocol TP4 ([IS0 8073]) in LOTOS also led ULg to send 10 new defect reports on ISO 8073. These defects were found as a result of a development of a LOTOS description of TP4 in the context of OSI95.

2 Activities within ETSI/NA5

The ETSI Technical Committee (TC) ETSI/NA is responsible for Network Aspects (NA) in general, and the Sub-Technical Committee (STC) ETSI/NA5 particularly takes account of Broadband aspects; i.e. it is responsible for the standardization of B-ISDN within Europe. Included in the scope of the latter is ATM technology and its related Physical Layer, and the ATM Adaptation Layer (AAL) protocols which sit on top of the ATM Layer.

The aim of participation of OSI95 within ETSI/NA5 was the introduction of a new work item on "high performance transport protocols" within B-ISDN. The STC ETSI/NA5 was selected as this is the group within ETSI where most of the expertise of the new evolving area of broadband communication is located. However, first of all it was necessary to clarify the assignment of responsibility for such work within ETSI.

To reach this goal it was necessary to consider the following important points: (i) the need for clarification of the relationship between the OSI Protocol Reference Model (PRM) and the B-ISDN/PRM; (ii) the necessity for layers (protocols) above the B-ISDN/AAL; and (iii) the requirements to be taken into account, when specifying the B-ISDN/AAL interface to the layers above the AAL.

The OSI95 contribution at the The Hague meeting in April 1991 ([ETSI 91/4]) identified that there is a need for layers above the B-ISDN/AAL, and provided the rationale for higher layers protocols within B-ISDN. Contribution at the Karlsruhe meeting in February 1991 ([ETSI 91/119]) shows the relationship between the AAL type 4 service and the OSI Data Link service and asks for studies on high bit rate protocols up to and including OSI Layer 4.

From the discussion stimulated by these contributions, a conclusion was reached on the need to check the relationship of the B-ISDN/PRM and the OSI/PRM on the one hand and to study the implications of higher layer protocols in the AAL on the other hand. Therefore it was proposed to introduce a new study item ([ETSI 91/172]) in NA5 (ETSI/NA5 meeting in Karlsruhe, February 1991, joint meeting AAL/PRS).

It is important to note that other members had also identified the need to develop protocols above the AAL and thus have supported the intentions raised by OSI95. This need was conformed by the Working Party ETSI/NA5/AAL. As a conclusion of the discussion around this issue, the terms of reference for the study point "Specification of the AAL interface to Higher Layers" ([ETSI 91/147-7]) was worked out at the NA5 meeting in the The Hague meeting (April 1991, joint meeting AAL/PRS).

Due to the fact that neither an ETSI working party nor a CCITT SG XVIII Working Party had already been charged to do this work (ETSI/NA5 Meeting held in Corfu, October 1991), a Liaison Statement to NA ([ETSI 91/135-2]) and a CCITT contribution ([ETSI 91/135-3]) for the CCITT SG XVIII meeting in Melbourne, 1991, was produced on the issue of "Future work on the layers above the AAL" (ETSI/NA5 meeting held in Corfu, October 1991).

Lastly it should be noted that, besides this activity, stimulated mainly by OSI95, proposals to commence study on new "high performance AAL types" to support data transfer were made (e.g. by British Telecom and France Telecom). However, no agreement on this subject has been reached so far.

2.1 Main Achievements within ETSI

A decision was made (ETSI/NA5 meeting in Montpellier, January 1992) that the Technical Committee ETSI/TE (Terminal Equipment) should be responsible for the standardization activity on transport and higher layers. However, since the expertise on B-ISDN is currently under ETS/NA5 it was decided that the latter group should start with this activity. As soon as ETSI/TE is able to take over the work, they will consider this activity. Within NA5, the AAL Working Party is dealing with this aspect.

Thus the main goal, to create a new work item which will deal with "high performance protocols above the B-ISDN/AAL" was fulfilled, and the responsible working group identified.

2.2 Current Situation on the "Offered Service of B-ISDN AAL for Connection Oriented (CO) Data Transport"

Although the basic goal, to identify a group within ETSI responsible for the specification of protocols above the B-ISDN/AAL, was achieved, there is still a very important open issue. Up to now, there is no clear understanding on the kind of service (in the OSI sense) the B-ISDN/AAL for data communication (i.e. U-plane of AAL-3/4 and 5) should offer to the higher layers, in order to allow existing protocols to be used.

ETSI/NA5 proposes to define the service in such a way that a well known OSI lower layer service is offered. Candidate services are, for example, Connection-oriented Data Link service (CCITT recommendation X.212), Connection-oriented Network Service (CCITT recommendation X.213) and Connection-oriented Transport Service TP0 (CCITT recommendation X.214). ETSI/NA5 is inviting the ETSI/STC's NA1, NA2 and TE to comment on this suggestion (ETSI/NA5 meeting in Berne, March 1993).

At the ETSI/NA5 meeting in Chester (May 1993), a discussion on the U-plane service to be provided at the AAL-SAP reflected a clear preference to provide the OSI Transport Service as defined in CCITT recommendation X.214.

However, as already mentioned above, no clear decision was made on this subject and further study is required. ETSI/NA5 is now awaiting technical contributions on this issue to fulfil the mandate of this new working field on "high performance protocol above the B-ISDN/AAL".

2.3 Interest of ETSI in the OSI95 Approach

The ETSI/NA5 delegates appreciate the approach followed by OSI95. They found it very important to identify first of all the communication requirements of future applications to influence the protocol specifications at an very early point in time. Furthermore, the idea to initiate forthcoming work on protocols above the AAL was welcomed.

However, the main problem within ETSI/NA5 was an organisational one. On the one hand, since the ETSI/NA5 group (as originally constituted) is only responsible for network issues, they did not want to extend their scope to include "end-terminal protocols". On the other hand, there is no other group where such an extensive knowledge on broadband communication is available.

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