ISO/IEC JTC1/SC7
Software Engineering
Secretariat: CANADA (SCC)

ISO/IEC JTC1/SC7 N1851

1998-01-28

Doc. Type	Letter Ballot Summary
Title	Letter Ballot Summary of CD15909 Information Technology - High Level Petri Net Standard.
Source	JTC1/SC7 Secretariat
Project	07.19.03
Status	First CD Ballot
References	N1793
Action ID	FYI or ACT
Due Date	
Mailing Date	1998-01-28
Distribution	SC7_AG, JTC1 Sec., P, O and L Members
Medium	Encoded PDF file
No. of Pages	8
Note	

Address reply to: ISO/IEC JTC1/SC7 Secretariat
Bell Canada - IT Procurement & Quality Engineering
2265 Roland Therrien, Room 226, Longueuil (Québec) Canada J4N 1C5
Tel.: +1 (514) 448-5217 Fax: +1 (514) 647-3163
sc7@qc.bell.ca

ISO/IEC JTC1/SC7/N1851

LETTER BALLOT SUMMARY

Project:	07.19.03		
Subject:	CD15909 Information Technology - High Level Petri Net Standard.		
Reference:	N1793, N1695, Resolution 487, N1779	Ballot:	CD 15909
Circulation date:	1997-10-02	Closing date:	1998-01-16
Circulated to:	Electronic: SC7_AG, JTC1 Sec.; Disk: P, O and L	Circulated by:	JTC1/SC7 WG11

TABLE OF VOTING AND COMENTS RECEIVED

"P" members	Approve	Disapprove	Abstain	Comments	Not voting
Australia	X			X	
Belgium					X
Brazil					X
Canada	X				
Czech Republic	X				
Denmark					X
Finland	X				
France					X
Germany					X
Hungary					X
Ireland					X
Israel		X*		X*	
Italy		X		X	
Japan	X			X	
Korea					X
Mexico					X
Netherlands	X				
Norway	X				
Romania	X				
Russian Federation					X
Singapore					X
South Africa			X*	X*	
Spain					X
Sweden					X
Thailand					X
UK	X			X	
Ukraine	X				
USA		X		X	

* Late vote

"O" and "L" members voting:

	Approve	Disapprove	Abstain	Comments	Not Voting
China					X
Portugal			X		
Liaison:					X

AUSTRALIA COMMENTS

General

Australia considers the CD to be at a mature stage, and ready for progression to FCD, with a few minor changes.

AUS1
Editor's notes should now be removed.

Specifics (Technical and Editorial)

AUS2
Title

The full title of the CD should be:
CD15909 Information Technology - High-level Petri Nets - Concepts, Definitions and Graphical Notation

(NOTE: The SC7 secretariat used an old title for the cover pages, but the new title is given on page 1 of the CD)

AUS3
Clarification of the use of the term High-level Petri nets.

Insert the following paragraph after the second paragraph of the Introduction:

Petri nets have been used to describe a wide range of systems since their invention in 1962. A problem with Petri nets is the explosion of the number of elements of their graphical form when they are used to describe complex systems. High-level Petri nets were developed to overcome this problem by introducing higher-level concepts, such as the use of structured data as tokens, and using algebraic expressions to annotate net elements. The use of "high-level" to describe these Petri nets is analogous to the use "high-level" in high-level programming languages (as opposed to assembly languages), and is the usual term used in the Petri net community. Two of the early forms of high-level net that this standard builds on are Predicate-Transition nets and Colored Petri nets, that were first introduced in 1979 and have been developed during the 1980s. It is believed that this standard captures the spirit of these earlier developments (see bibliography).

AUS4
Clause 3, 3.1 Glossary

Move the Note at the beginning of the Glossary to the beginning of clause 4.

AUS5
Clause 3, 3.1 Glossary

Add the following two items to the glossary

Multiplicity: A natural number (ie non-negative integer) which describes the number of repetitions of a set element in a corresponding multi-set.

Step: The simultaneous occurrence of a multi-set of transition modes that are concurrently enabled in a marking.

AUS6
Clause 4. Add the following sentence for clarification.

The graphical notation used in the examples of clause 6.3 is that defined in clause 8.

AUS7
Clause 4, 4.1 Sets

Remove the indentation and fly-dots.

AUS8
Clause 10.

Replace the first sentence by

It is possible to conform to this International Standard at 3 levels, where level 1 is the weakest and level 3 is the strongest conformance.

AUS9
Clause 10.3

Replace "section 7" by "clause 7" in the last line.

ISRAEL COMMENTS

As can be seen from the Editor's Foreword and Annex A, there are still technical decisions to be made and information to be added. Once these activities are completed, the document will be worthy of approval.

ITALY

ITAG01: In our opinion a standard should be general enough to include most of the features available in the (most popular)(HL)PN variants that PN researchers have been developing in the last years: this means that the standard should be rather general, and then subclasses could be defined by imposing restrictions on the general definition (motivated for example by the availability of analysis tools and/or by peculiar properties).
We therefore propose to extend the definition of the HLPN semantic model presented in clause 5 as suggested in ITATH01 and make the definition of HLPNG in clause 7 more general as suggested in ITATH02. In our opinion, also some refinements of the HLPGN, like those described in ITATL01 and ITATH04, would improve the definition (in the sense of getting closer to some relevant existing HLPN formalisms).

ITAG02: The document should include an appendix showing for several existing HLPN formalisms in use their conformity level with respect to the standard proposal. It would also be interesting to give a classification of HLPN formalisms showing the various classes and the relations among them. The HLPNG definition (modified according to ITATH02) would be the root class from which the concrete formalisms could be derived by giving a semantics to the signature, and possibly by adding restrictions. Subclasses

of the concrete formalism classes could then be defined by further restriction (in particular syntactical restrictions leading to subclasses with interesting properties or for which special analysis algorithms are available could be included in the classification). We could prepare a first version of this appendix.

ITAG03: In the current version of the document there are some missing concepts and definitions that should appear and that are important in order to have a common corpus of concepts:

1) at the behavioural level: Concurrency, Conflict, Causality (see ITATH04);
2) at the structural level: syntactical subclasses of HLPNs, structural conflict, mutual exclusion, causal connection relations, structural objects (deadlocks and traps, P/T-semiflows, etc.);
3) some examples of important properties: boundedness of places, mutual exclusion, deadlock freeness, liveness, home states.

ITAG04:It is important to make the standard appealing for software designers: hence it would be important to explain how it is possible to use the standard in this context and we are afraid that this might be difficult to achieve without any hierarchy/modularity concept.

ITATH01: We propose to change the HLPN semantics (clause 5) to allow an additional element "Cond", defining a function that for any transition mode and marking returns a boolean value which conditions the enabling of the transition mode. This could allow to include in the standard definition some useful features such as inhibitor/test arcs, transitions with priorities, places with capacity, etc. The enabling of transitions modes (5.3) should be changed into:

$$Pre[T\mu] <= M \text{ and } Cond(T\mu,M)=true$$

Hereafter we discuss in detail the opportunity of adding inhibitor/test arcs and transition priorities and explain how they can be implemented by using the function Cond above.

Inclusion of Inhibitor/Test arcs: The main motivation for including the inhibitor arcs, even when it could be possible to simulate them through the addition of complementary places (which is not always the case), is modeling convenience: we think that in an application oriented standard it should be possible to have directly such convenient features as inhibitor arcs, test arcs, and perhaps also marking dependent arc functions (e.g., to implement in a single firing, rather than in a step, the withdrawal of all tokens in a given place). Note also that using complementary places for implementing inhibitor arcs, does modify the concurrent semantics of the model, and this may be crucial when the transition involved in this transformation is for example a timed transition in a (G)SPN model. A possible alternative to inhibitor/test arcs is to allow the transition enabling to depend on a marking dependent predicate (the advantage of this approach is its generality, its disadvantage is the fact that the predicate does not provide a graphical representation of the set of places that influence the enabling of a given transition, however such indication could easily be included by the addition of appropriate graphical annotation, e.g., some dotted arcs connecting the places whose marking can affect the enabling of a given tran-sition to the transition itself). A general way of including these features in the HLPN semantic model of clause 5 is to add an element "Cond", defining a function that for any transition mode and marking returns a boolean value which conditions the enabling of the transition mode. To implement inhibitor/test arcs, Cond would be a function checking that in the current marking some places do not contain/contain a given multiset of tokens.

Inclusion of Transition Priorities: the possibility of having of transition priorities is very important for people working on Generalized Stochastic PN (GSPN) and Stochastic Well-formed Nets (SWN). Priorities are a MUST for GSPN and SWN formalisms: we don't think it makes sense to add them later, when introducing time, since these formalisms consider as the underlying untimed model, the one which takes already priorities into account. The implementation of priorities through an additional net structure is not reasonably practicable! This feature could instead be included in the semantic model with the same technique of adding a Cond which should also consider some additional definition at the level of the net structure which defines priorities among transitions (hence Cond could include a Cond.Prio defining the transition priority definition, and Cond.Pred defining a marking dependent predicate using the information encoded into Cond.Prio).

ITATH02: We propose to change the definition of HLPNG (clause 7.2) so that only the signature is defined without any corresponding semantics. The HLPNG would thus have R-sorted places rather than ``typed'' places, and the initial marking m0(p) should be defined as a multiset of ground terms (i.e. terms without variables) of proper sort. Different existing formalisms could then be obtained by assigning a different semantics (and corresponding definition of Marking - clause 7.3, Enabling - clause 7.4, and Transition Rule - clause 7.5) to the signature.
If an element "Cond" is added to the definition of the HLPN semantic model (see ITATH01) then a corresponding syntactic element should also be added in the definition of HLPNG, consisting of a function allowing to define further (marking dependent) condi-tions for the enabling of transition modes in a given marking: this element could be left generic in the HLPNG standard definition and its precise definition would be given in the concrete formalisms definitions.

ITATH03: In HLPNs, variables are local to transitions, hence it looks weird to have them declared globally. By the way, the variable types can be inferred from the places types and function definitions, so that it is not clear why we don't allow an implicit declaration (then the various standard conformant implementations will be free to add such declaration if they wish). More- over symbols can be easily overloaded, so that for instance the same variable name x can be used for different transitions with different types without creating any harm, due to the local scope of transition variables.

ITATH04: We propose to add a section 5.5 where some basic concepts such as Concurrency, Conflict, Causality are defined (see ITAG03).

ITATL01: In the formalization of the sorts and operators there is no mention of ``constructors'' of complex sorts from simple ones (so that the types can then be defined as Cartesian product, union, list-of, etc., of ``basic'' types). In the document, the Cartesian product operator is used in the definition of place Access type, and the tuple notation (x,m) is used in the annotation of the input/output arcs of this place in the example of
Figure 2, section 6.3.2 without providing an explicit definition at the declaration level: we think this should be formalized to gether with a number of implicitly defined ``standard'' operators (e.g. projection over a subset of components for tuples, etc.).

ITAE01: Since also in Italian (as in English and French) the name for places ("posti") starts with "p", we would rather have the symbol "P" used to indicate the set of all places, as we are accustomed to.

ITAE02: In the third line of 1.1, "of: the technique;" should be"of the technique"

ITAE03: In the list of fields of application (1.2) it could be appropriate to add Control Systems and Fault tolerant Systems.

JAPAN COMMENTS

JPN 001 G: Many of inadequate descriptions as IS should be reviewed and corrected to be conformed to ISO/IEC DIRECTIVES (6.6.1 Verbal forms for the expression of provisions). For example,

a) P.13, 4.3 Concepts from Algebraic Specification, line 7: ``..., we need concepts (B'' should be read as ``..., concepts are necessary ...''.

b) P.13, 4.3.1 Signatures, line 27: ``... is known as the input or argument sorts, ...'' should be read as ``... is named as the input or argument sorts, ...''.

c) P.13, 4.3.1 Signatures, line 32: ``... would represent a binary predicate symbol, ..." should be read as ``... represent a binary predicate symbol, ...".

d) P.9, line 30: ``Multiset: ... where (meaningful) repetition ..." should be read as ``Multiset: (B where repetition ...".

e) P.19, 6.2.2 Transition Modes, line 29: ``Remark: ..." should be read as ``NOTE: ...".

JPN 002 E: The CD's title ``High Level Petri Net Standard " shall be replaced with simply ``High Level Petri Net".

JPN 003 E: P.8: ``3 Glossary of Terms and Abbreviation" shall be replaced with ``Terms and definitions", and the introductory wording required by ISO/IEC DIRECTIVES is necessary.

JPN 004 E: The line ``1.1 Intent" shall be deleted.

JPN 005 E: P.19: ``6.3 Examples" shall be moved into ``Annexes".

JPN 006 E: P.21: The line ``7.1 Introduction" shall be deleted.

JPN 007 E: P.20, line 8: The explanation of (1,1) , (2,0) , (3,2) and (4,0) in the equation M0(p1) = {(1,1),(2,0),(3,2),(4,0)} is necessary for facilitating the understanding.

JPN 008 E: The description method of Declarations in Figure 1 (p.20) and Figure 2 (p.21), for example, A= {1,2,3,4} in Figure 1 and Set of Agents: A= { $B!D (B} in Figure 2, should be same.

JPN 009 E: P.20: The explanation of < > and the dot in it in Figure 2 is necessary.

JPN 010 E: P.25, 8.4 Arcs, line 32: The sentence ``In order to distinguish multiplicities from terms, the convention is adopted ..." should be moved to Subclause 4.2.1, because the convention in this sentence is used in Subclause 6.3 and hence the sentence should be placed before Subclause 6.3.

JPN 011 E: P.25: The graphical symbols used in 8.2, 8.3 and 8.4 should be described as a figure defined in ISO/IEC DIRECTIVES.

JPN 012 E: P.26, 9 Semantics of HLPN Graph, line 23: The notation of Pre and Post Maps is misleading; "Pre" in line 26 and the first ``Pre" in
line 31 are not the same map, and "Post" in line 27 and the first ``Post" in line 32 are not the same one. To avoid this ambiguity,

(1) ``(s,t)" in "Pre(s,t)" in line 26 should be a subscript of ``Pre", rather than the usual form of arguments.

(2) ``(s,t)" in ``Post(s,t)" in line 27 should be a subscript of ``Post", rather than the usual form of arguments.

(3) ``Pre(s,t;m)" in line 28 and line 31 should be written as ``Pre_{(s,t)}(m)", i.e. Pre with subscript (s,t) applied to m.

(4) ``Post(s,t;m)" in line 29 and line 32should be written as ``Post_{(s,t)}(m)", i.e. Post with subscript (s,t) applied to m.

SOUTH AFRICA COMMENTS

We have abstained from voting since we do not have the local expertise available at present to make serious technical comment on this document.

UK COMMENTS

Editorial

1. Clause 4 - Conventions and Notation

This material would do better in an Annex. Clause 4 is the prescribed position to define notation, but when it is such a meaty clause, and many potential readers would be able to understand the standard fairly well without having read clause 4, it is reasonable to say in clause 4 something like " This International Standard uses the notation for many-sorted algebras defined in Annex x."

Technical

2. Editor's Foreword

We support the editor's suggestion to revise the symbols that are used; the standard will be more readable if the use of symbols is compatible with their usage in other areas.

3. Clause 10 - Conformance

It is not clear that there is any benefit in the distinction between Level 1 and Level 2 conformance. On the other hand there might be some benefit in defining Level 1 conformance in terms of the basic topology and initial marking; this would allow automatic checking of network equivalences and would cover both basic and High Level Petri nets.

USA COMMENTS

The USNB appreciates the work performed by SC7/WG11 in this first Committee Draft

General Comments
The purpose of an initial CD ballot is to confirm the scope and purpose of the draft standard as stated by the originating NP.
The status of a possible subdivision for the committee draft standard makes the achievement of this purpose difficult."

USA - 1 TH. Add a definition for "high-level".

USA - 2 TH Add explanatory text in the introduction stating that the scope of this draft standard is for "high-level" petri nets in the sense of higher-order programming languages.

USA - 3 TH Also state explicitly that "colored petri nets" are within the scope of this standard.
USA - 4 TL Make the notation changes suggested by the editor, e.g. Use "P" for Place instead of "S" etc.

USA - 5 TH. Add a clause that documents the entities, relationships and attributes of this Petri Net technique standard using the framework and notation documented in FCD 15474-2, Information Technology - CDIF Framework - Part 2: Modeling and Extensibility (7N1541R1).

USA - 6 G. Comment. Conformance
The document uses an interesting and well-defined approach to conformance.