SEMI E37.2-95
HIGH-SPEED SECS MESSAGE SERVICES GENERAL SESSION (HSMS-GS)

1 Purpose

HSMS-GS is intended to support the needs of complex systems containing multiple independently accessible subsystems such as cluster tools or track systems. Specifically, procedures are defined to permit access to any individual subsystem or set of subsystems within any complex system.

2 Scope

High-Speed SECS Message Services General Session (HSMS-GS) is a subsidiary standard to High-Speed SECS Message Services (HSMS) Generic Services.

3 Applicable Documents

3.1 *SEMI Standards*

SEMI E37 — HSMS Generic Services

SEMI E4 — SEMI Equipment Communications Standard 1 - Message Transport (SECS-I)

SEMI E5 — SEMI Equipment Communications Standard 2 - Message Content (SECS-II)

4 Selected Definitions

Selected Entity List — A list of session entities currently selected for communication on a given TCP/IP connection.

Selection Count — The number of sessions opened by an HSMS Select procedure and not yet ended by an HSMS Deselect or Separate procedure.

Session Entity — an individually selectable entity within an HSMS-GS system.

Session Entity ID — A 16-bit identifier for a SessionEntity.

SessionEntityList — A list of all available session entities within an HSMS-GS system and associated with a particular IP address and port number.

In addition, all definitions for HSMS Generic Services apply.

Note that the terms HSMS and HSMS Generic Services both refer to the HSMS Generic Services standard definition (SEMI E37).

5 HSMS-GS Overview and State Machine

HSMS-GS provides a set of definitions which permit the individual subentities (e.g., subsystems) of complex entities (e.g., systems) to be separately accessible during HSMS procedures. HSMS-GS defines no new procedures or message types beyond HSMS Generic Services to provide these services. It does, however, require extensions to the HSMS State machine, in the form of additional state transition definitions and additional state information, which are used by the extended state machine which must be maintained by an HSMS-GS implementation to support the extended state machine. The additional information consists of the following:

1. The Session Entity List
2. The Selected Entity List
3. The Selection Count

The Session Entity List consists of the set of all Session Entities having individual accessibility within the HSMS-GS entity. The scope of this list is normally the entire HSMS-GS entity. HSMS-GS, however, does not require this scope: the supplier may provide access to HSMS-GS entity through more than one well known port and provide a different Session Entity List for each.

A Session Entity is any individually addressable subentity within the HSMS-GS entity: for example, a Session Entity may be an individual sub-device in a track system or cluster tool, or may be an individual service provider, such as a data server, within an entity. HSMS-GS only provides the conventions for identifying Session Entities. It places no restrictions on the individual supplier as to what constitues a SessionEntity: the supplier must determine what is the most appropriate for the particular implementation.

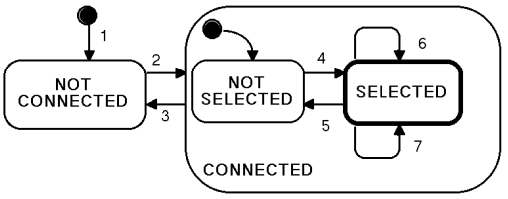
The Selected Entity List is the list of Session Entities actually selected for access on a given TCP/IP connection. When the TCP/IP connection is established (CONNECTED state entered), an empty Selected Entity List is created. Each time, the Select Procedure is used to select a Session Entity, its Session Entity ID is added to the Selected Entity List created for that

TCP/IP connection. Each time the Session Entity is deselected via the Deselect or Separate procedures, its Session Entity ID is removed from the Selected Entity List. At any given time on any given TCP/IP connection endpoint, HSMS Data Messages will only be accepted by an entity if the SessionID of the Data Message is equal to any Session Entity ID in the Selected Entity List.

The Selection Count is simply the number of Session Entity IDs in the Selected Entity List. Its value affects the behavior of the state machine: the transition to NOT SELECTED from SELECT can only take place when the SELECTION COUNT is zero.

Note that the above lists and count are defined for the purpose of explaining state machine operation only. There is no requirement that any of the above lists and count be explicitly implemented.

5.1 *HSMS-GS State Machine* — The HSMS-GS state machine is the same as the HSMS Generic Services state machine with the addition of the two new state transitions (#6 and #7) and the use of the Selection Count in the other transitions as described in the state transition table below.



5.2 *State Descriptions* — The state descriptions are the same as HSMS Generic Services.

5.3 *State Transition Table* — The state transition table is almost identical with the state transition table for HSMS Generic Services. For convenience, however, the entire table is reproduced and extended here, not just those areas which differ from it.

#	*Current State*	*Trigger*	*New State*	*Actions*	*Comment*
1	...	Local entity specific preparation for TCP/IP communication.	NOT CONNECTED	Local entity-specific.	Action depends on connection procedure to be used: active or passive.
2	NOT CONNECTED	A TCP/IP connection is established for HSMS communication.	CONNECTED - NOT SELECTED	Set Selection Count=0 and create empy Selected Entity List.	none
3	CONNECTED	Breaking of TCP Connection.	NOT CONNECTED	Local entity-specific.	none
4	NOT SELECTED	Successful completion of HSMS Select Procedure.	SELECTED	Set Selection Count=1 and add selected Session Entity to Selected Entity List.	none
5	SELECTED	Deselect or Separate procedure resulting in Selection Count = 0.	NOT SELECTED	Local entity-specific.	See transition 7 below.
6	SELECTED	Successful completion of HSMS Select Procedure when Selection Count>0	SELECTED	Increment Selection Count and add selected Session Entity to Selected Entity List.	none
7	SELECTED	Successful completion of HSMS Deselect or Separate when Selection Count > 1.	SELECTED	Decrement Selection Count and remove selected Session Entity from Selected Entity List.	If this transition results in Selection Count = 0, immediately trigger state transition 5.

6 HSMS-GS Use of TCP/IP

There is no additional HSMS-GS specification for the use of TCP/IP beyond the above mentioned creation of the empty "Selected Entity List" upon entry into the CONNECTED state, NOT SELECTED substate.

7 HSMS-GS Specific Procedures

HSMS-GS provides further specification of the following procedures.

7.1 *Select Procedure* — The select procedure is permitted in both the NOT SELECTED state and the SELECTED state. The procedure for both the initiator and the responding entity is the same as HSMS Generic Services, with the following additional conditions:

1. If the responding entity contains no Session Entity in its Session Entity List whose ID matches the SessionID in the Select.req, a Select Status of No Such Entity is used in the Select.rsp.
2. If the responding entity is unable to provide access to the selected entity because it is usable on only a single TCP/IP connection at any one time and it is already in use on a different TCP/IP connection, a response code of Entity In Use is used in the Select.rsp.
3. If the responding entity finds the SessionID already in its Selected Entity List, a response code of Entity Selected is used in the Select.rsp.

The Select Status values referenced above are all defined in Section 8.

If none of the above is true, the Select completes successfully, and a Select Status of 0 is provided in the Select.rsp. Both entities will add the SessionID from the Select.req to the Selected Entity List.

7.2 *Data Procedure* — The Data Procedure is as defined in HSMS Generic Services. Note that the SessionID of any Data Message must match a SessionID in the SelectedEntityList. If a Data Message is received with a SessionID other than one from the Selected Entity List, a Reject.req message is sent in response by the receiving entity. The reason code will be Entity Not Selected.

7.3 *Deselect Procedure* — The Deselect procedure is restricted by the following conditions:

1. The SessionID must be in the Selected Entity List.
2. The corresponding SessionEntity is in a state which permits Deselect. This decision is local entity specific and not subject to the HSMS-GS.

If both of the above are true, then the Deselect can proceed. Assuming that the Deselect completes successfully, the SessionID is removed from the Selected Entity List, and the Selection Count is decremented. The transition to the NOT SELECTED state transpires only if the resulting Selection Count is equal to zero (i.e., an empty Selected Entity List).

7.4 *Linktest Procedure* — As defined by HSMS.

7.5 *Reject Procedure* — As defined by HSMS. Note, in particular, the use of Reject in response to certain data messages (above).

7.6 *Separate Procedure* — The Separate procedures and state transitions are subject to the same restrictions and conditions as the Deselect.

7.7 *Communications Failures* — As defined by HSMS. Note that any abrupt termination has the effect of deselecting all entities in the Selected Entity List.

8 HSMS-GS Message Format Issues

8.1 *Session ID* — In HSMS-GS Select, Data, Deselect, Reject, and Separate messages, the SessionID will equal the Session Entity ID of the target Session Entity which must equal the Session ID of a Session Entity contained in the Session Entity List. In the Linktest, it is 0xFFFF, as in HSMS.

8.2 *PType* — HSMS-GS messages are generally PType = 0 (SECS-II-encoded) as defined in HSMS. Although other PTypes are permitted, specific application domains may restrict the use of HSMS-GS to Ptype = 0.

8.3 *SType* — Only HSMS-defined STypes are permitted in HSMS-GS.

8.4 *Select/Deselect Status* — The following additional enumeration applies to the select/Deselect status in HSMS-GS:

SelectStatus

Value	*Description*
4	No Such Entity — Session ID does not correspond to any Session Entity ID available at this connection.
5	Entity In Use (by another connection) — Session Entity corresponding to session ID is not sharable connections and is already selected by another connection.
6	Entity Selected (by current connection) — Session entity corresponding to Session ID is already selected on current connection.

9 Special Considerations

There are no special considerations above and beyond those described in HSMS Generic Services.

10 HSMS-GS Documentation

An HSMS-GS implementation is required to document the following information in addition to the information required by HSMS.

1. The Session Entity List — specifically the number of Session Entities available for HSMS-GS communication and the value of their particular Session Entity ID's.

RELATED INFORMATION 1 APPLICATION NOTES

NOTE: This related information is not an official part of SEMI E37.2 and is not intended to modify or supercede the official standard. Publication was authorized by full letter ballot procedures. Determination of the suitability of the material is solely the responsibility of the user.

R1-1 Supporting Both HSMS-GS and HSMS-SS Simultaneously

In certain applications, the equipment manufacturer may be faced with a requirement of providing both HSMS-GS and HSMS-SS communications interfaces. For example, a cluster tool may use HSMS-GS as the intra-tool communications and HSMS-SS as a GEM interface to the factory. However, implementing a communications facility that is simultaneously HSMS-SS- and HSMS-GS- compliant is straightforward.

Assuming that one has implemented an HSMS-GS, a simple test can be added to the first Select.req received by the equipment. If it is a Select for any particular SessionID, then operate as HSMS-GS. If its value is a -1, then copy the contents of the Session Entity List corresponding TCP/IP IP address and port number into the Selected Entity List. The Selection Counter would be set to a special value, such as -1, to indicate selection in this manner. The Separate would provide the reverse function. If the passive entity is implemented as an HSMS-SS node and the active entity is an implementation that supports both modes of operation, it must be explicitly configured to initiate the Select with a Session ID of -1 and must have a Session Entity List containing the Device IDs of all the available subdevices within the passive mode entity.

In the local API for the case where the equipment must originate the select, a configuration parameter for the equipment could indicate which mode to use for a particular remote target.