The following application note addresses an issue with SAM600 1.2 seamless GPS grandmaster switchover affecting synchronization of IEC 61850 smpSync attribute.

Background
IEC/IEEE 61850-9-3 specifies that a GPS grandmaster switchover (in case of synchronized clocks) should happen within 16s. During a switchover, client devices normally enter the so-called “holdover” mode for at least 5 seconds, during which clock accuracy is given and the IEC 61850-9-2 smpSync attribute is kept at the last known state.

While SAM600 1.2 adheres to the above listed requirements in terms of time synchronization, this application note is issued in order to realize a seamless grandmaster switchover without affecting the IEC 61850-9-2 smpSync attribute, i.e. no blocking of protection on bay level control and protection equipment during the clock transition phase.

General recommendations
In order to fulfill a seamless GPS grandmaster switchover, the following requirements must be fulfilled from the viewpoint of a SAM600 system:
• Redundant GPS master clock must be installed on the network
• SAM600 system must only be synchronized through a transparent clock capable switch or device
• In case of a IEC 61850 process bus being synchronized through a boundary clock, the boundary clock must be switched off, and a connection through a transparent clock to the SAM600 system must be done.

Recommended communication topologies
The following figures list different recommended communication topologies, taking into account the general recommendations.

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<th>Station bus</th>
<th>Process bus</th>
<th>Single</th>
<th>Figure 1</th>
<th>PRP</th>
<th>Figure 2</th>
<th>HSR (or PRP)</th>
<th>Figure 3</th>
<th>Figure 4*</th>
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*) Architecture depicted in Figure 4 requires the use of one (1) additional SAM600-TS module
Topology 1 – Single process bus, single station bus connection

Topology 2 – Single process bus, redundant station bus connection

Topology 3 – Redundant process bus, single station bus connection

Topology 4 – Redundant process bus, redundant station bus connection

More information
Please contact support line at ABB Grid Automation Products (sa-t.supportline@se.abb.com) for more information.