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What options are available to secure the interoperability of the converters without engaging the 3rd parties ?

Methods to secure the interoperability of the converters without engaging the 3rd parties

One effective way is for HVDC vendors to build converter simulation models. Then the purchaser, such as a power system operator, receives those converter simulation models from the vendors. The system operator combines the models and conducts offline or HIL (hardware in the loop) simulations to confirm interoperability between the converters.

The converter model consists of the main circuit and control and protection block diagram. The converter models should be blocked-boxed since the converter's circuit, and control and protection system are designed by each vendor and include the vendor's intellectual property.

Then the purchaser, such as a power system operator, receives those converter simulation models from the vendors. The system operator combines the models and conducts offline or HIL simulations to confirm interoperability between the converters. A simulation service company may support the purchaser in conducting many simulation cases.

It is desired that simulation result waveforms are shared and reviewed by the purchaser, vendors (and third party if necessary).

Figure 1 shows an example of responsibility sharing between the HVDC purchaser and vendors. If the purchaser can take responsibility for confirming the interoperability between converters, the HVDC project may proceed without a third party.

A third party may be necessary if the purchaser has difficulty confirming interoperability. However, it may be possible to reduce the involvement of the third party by clarifying the scope of responsibility between the purchaser, vendors and third party.

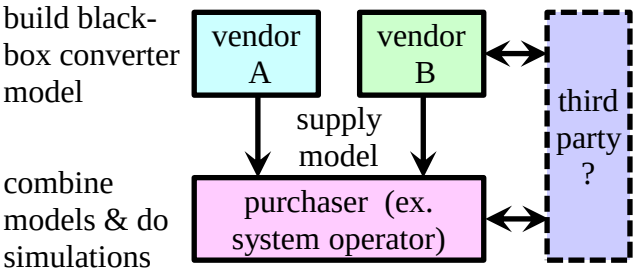

Figure 1 Example of responsibility sharing between purchaser and vendors.