Pace Americas, Inc. 3701 FAU Boulevard,
Suite 200, Boca Raton Florida 33431
Tel: 561 995 6000 Fax: 561 995 6001

Dynamic Switchable Conditional Access

By Chris Dinallo, VP-Technology, Pace Americas

Concept of Switchable Conditional Access (S-CA):

A dynamic S-CA system allows cable operators to employ more than one CA mechanism in their network. By having this capability, the operator is not locked into a specific CA system or CA supplier vendor. The challenges this flexibility creates spans from the head-ends to the set-tops. From the set-top perspective, logic must reside in the box that enables it to receive/de-scramble more than one CA mechanism and it must do this dynamically, seamlessly, and in real-time.

There are three interesting scenarios in implementing a S-CA system. Let's assume the example of using Motorola's CA system and another from the DVB standard:

1. Simulcast (i.e. Digicipher II and DVB):
   - Two head-ends feeding statically provisioned set-tops.
   - Two versions of each service are delivered including their own CA.
2. S-CA: where some broadcast services employ one CA (DCII) and other services employ an alternative CA system (e.g. DVB-DES).
   - Each box on the network can decrypt either CA on a service-by-service basis.
3. Simulcrypt CAs: where the CA systems are multiplexed.
   - Both CAs are applied to each service.
   - Either CA will decrypt each service.

Of the three, scenario #2 (which inherently encompasses all three scenarios) offers the most flexibility to the operator. Pace envisions the solution as one that can be carried out via software logic and parsing the appropriate MPEG-2 tables.

Hardware Implications:

The majority of Pace's US cable set-tops are fully capable of supporting most if not all the CA systems that may be considered for operators' networks. Pace and its silicon partners are very capable companies with the licenses and experience in CA systems around the world. The end result is that because some CA systems allow the scrambled MPEG-TS to pass-through the CA system silicon (i.e. "pass-thru mode" when activated) and enter directly into the silicon decoder, Pace has developed software in combination with capable decoder silicon that gets pre-set such that the decoder silicon performs de-scrambling of the alternative CA ala DVB-DES.

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Software Solution:

As previously mentioned, the Pace S-CA solution is largely a real-time software solution that leverages the capabilities of the decoder silicon along with the inherent logic of the CA module. When the CA interrogates the CA_SYSTEM_ID type, it looks to take action on the type being set to its native format. Anything other than this type puts the CA into its pass-thru mode.

When in pass-thru, the scrambled and encoded MPEG transport stream is streamed into the silcion directly. Pace drivers will then determine the ID type and interact with the appropriate decryption engine. This decryption engine may be fully embedded ala a Secure Micro chip or may be removable as in a smart card (e.g. NDS, Nagra, etc). The decryption engine will decrypt the encrypted keys; these can then be passed back to the decoder silicon for de-scrambling of the MPEG transport stream. From here, normal decoding of the MPEG transport stream commences. Appropriate head-end configuration and interaction with the set-top assures no perceptible increase in channel tuning delay when switching from one CA to another.

It’s worthy to note that the operator’s CA equipment must have the ability to set the CA_SYSTEM_ID field within the transport stream.

As an alternative method for implementing S-CA, the operator could statically provision (a priori) specific services/channels for which the set-top is also statically configured for the appropriate CA. This implementation is less than optimal because much provisioning and configuration is required on both the head-end and set-top when channel line-up changes are made.