CONFIDENTIAL

NAGRAVISION

WHITE PAPER

PPV AND IPPV MODES FOR DNASP2 SYSTEMS

1.1

Contents

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1. Introduction

The Nagravision CAS offers a range of products, from simple subscriptions to prepaid impulsive pay-per-view products. Depending on how the products are to be sold the CAS must be configured to function in the appropriate mode.

This document describes in detail the concept and the requirements of each of the modes available with the Nagravision CAS. The advantages and disadvantages are also studied here, as well as the limitations for some of the modes.

The main modes of operation of the CAS are:

- Order Ahead Pay Per View (OPPV)
- **Postpaid** impulsive pay-per-view (IPPV)
- **Prepaid** impulsive pay-per-view (IPPV) **without** return path
- **Prepaid** Impulse pay-per-view (IPPV) **with** return path

Technically speaking, it is possible to have a mixed set of subscribers in any mode, for example postpaid and prepaid subscribers with a return channel, or prepaid subscribers with and without a return channel, or postpaid and prepaid subscribers with a return channel and prepaid subscribers without it.

It is not, however, possible to switch a subscriber from one mode to another, except by creating a new contract and sending a new smart card.

From a business, operational and user experience point of view, however, it is often difficult to mix all these modes. The increased complexity of the system, the potentially confusing user interfaces on the STB and the risk of problems due to operational mistakes leads most of our customers to choose one or two modes that best suits their business requirements.

This document describes the various modes and the impact of mixing those modes.

1.1 References

[SMS_GWY] Nagravision SMS Gateway Specification (SasGwyStdSpe020706.pdf)

1.2 Document History

Version	Author(s)	Date	Description
1.0	Gilles Russ	April 12, 2005	Initial version
1.1	Gilles Russ	April 13, 2005	Updated pay modes diagrams and minor corrections following internal review

2. Order ahead Pay per Views or OPPV

Here, the subscribers call the Customer Service Centre and order a specific product. The CAS makes sure the corresponding rights are sent to the smart card while the billing is being done by the Subscriber Management System (SMS).

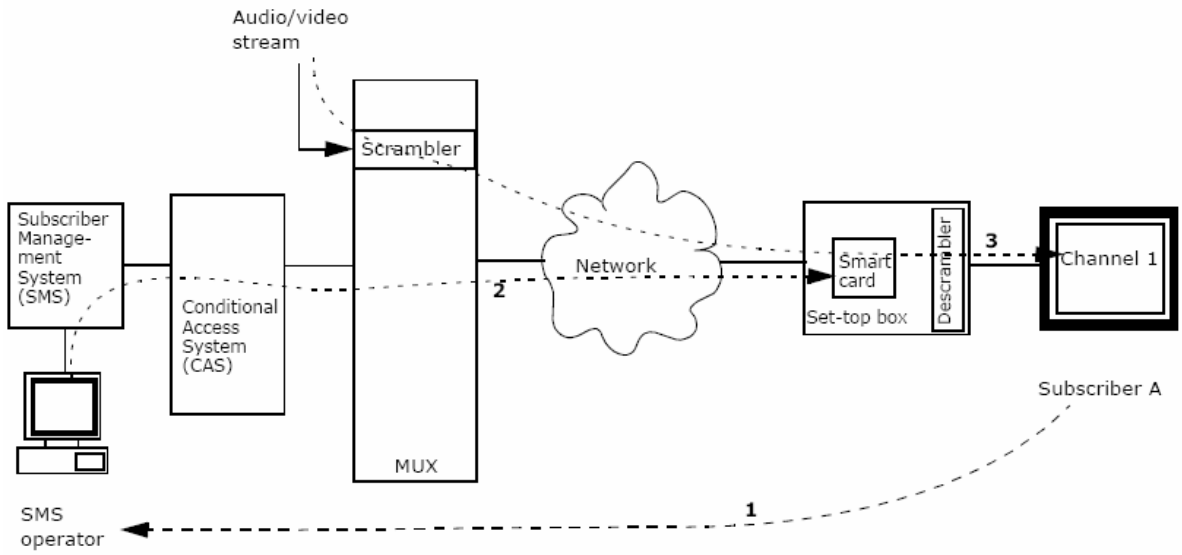

Figure 1: Model for Subscription and OPPV Modes

The pre-booked pay-per-view is a product where a subscriber purchases the right to view a particular event, not a whole service.
Subscriptions are usually purchased for long periods of time, typically one year. The pre-booked PPV products are ordered at a per-event basis, usually by calling the operator's call center. Creating the viewing right on the smart card works like this:

1. The subscriber asks the call-center for a PPV event; whether it is by mail, telephone or any other means of communication (PPV events are normally only ordered via telephone).
2. After receiving the order for a subscription or a PPV event from a customer, the operator creates the right for the subscription or PPV event directly into the subscriber's smart card by sending the appropriate commands via the SMS.
3. The subscriber can watch the PPV event

Typically, PPV events can be advertised through the TV Guide or by running ads on a dedicated promotion channel.

An easy and cost effective way to attract subscribers is to give them free access for a few minutes at the beginning of the event. The preview window locks subscribers in by giving them a chance to look at the event before purchasing. The length of this preview window is configurable for each event.

3. Postpaid Impulse Pay Per View (IPPV)

The postpaid impulsive pay-per-view is a product that a customer can purchase simply by using the remote control unit (this is known as an *impulsive* purchase). The term *postpaid* means that the operator is not able to bill the subscriber for that particular event until after its purchase.

Allowing subscribers to buy events impulsively with their remote control increases the Average Revenue Per User (ARPU) while keeping an eye on the resources at the Customer Service Centre.

It is possible to define a purchasing window during which a subscriber can buy an IPPV event.

One crucial aspect of IPPV is to find the right balance between customer-friendliness and security. While subscribers would like to order quickly by going through a very few steps, you have to ensure that the credit management in the smart card is done correctly and securely. Based on our experience with our existing customers, we have developed a solution that fits both requirements.

The credit threshold can be defined per subscriber, thus giving a higher buying power to regular well-known customers and limiting revenue loss exposure with newly acquired customers.

In order for the subscribers' decoders to send the information about the IPPV events purchased and watched and the status of the credit/debit information to the head-end, a return channel (telephone line or cable) has to be available. Of course, all this information is sent encrypted and signed.

Call backs can be scheduled to occur during the night to minimize phone rates and phone line contention, can be triggered from the billing centre or can be initiated "locally" by the STB (when a specific condition is met, such as low credit, full memory, etc.)

There can be a long period of time between the moment a subscriber watches an event and the moment the event is reported to the SMS. By default the system is configured for a monthly reporting cycle.

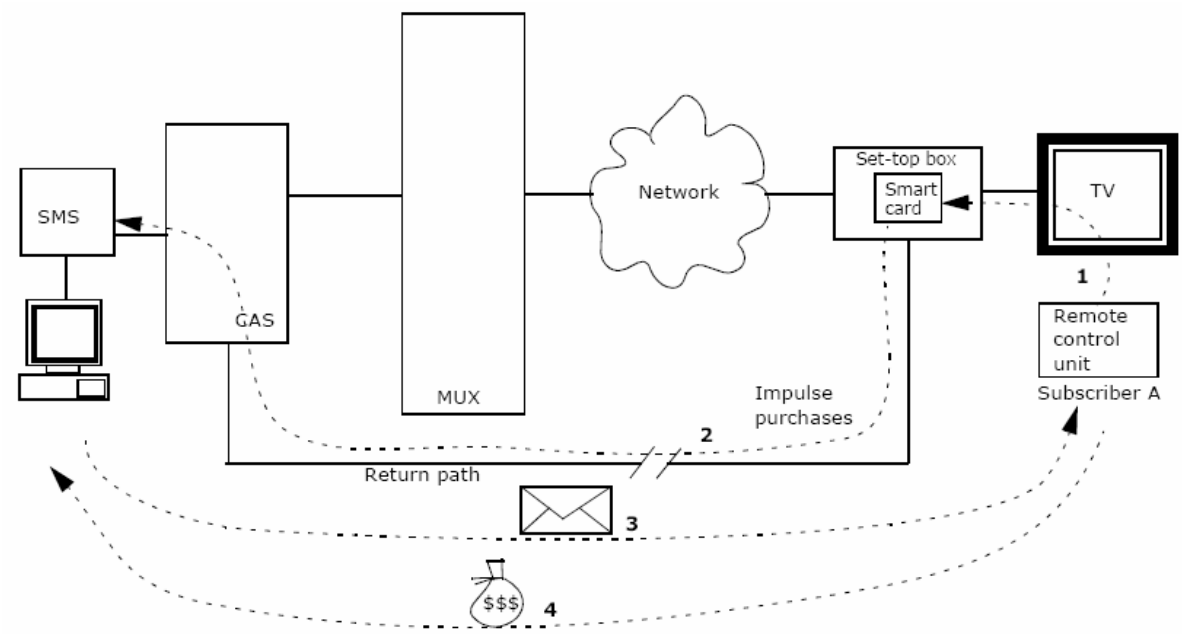

Figure 2: Model for the postpaid IPPV mode

Basically, this is how it works:

1. When a new customer is introduced into the system a series of commands are sent to the customer's smart card. Among these commands there is the creation of a credit record to which an initial amount of cash is assigned. It is important to realize that in the *postpaid* context, the cash introduced into the smart card is not real money already paid by the subscriber. The cash introduced in more like the credit limit on a credit card. The subscriber is now able to purchase events using the remote control. With each purchased event the debit value on the smart card is increased by the cost of the event. As long as the balance (credit – debit) on the smartcard is enough, the subscriber may continue to purchase events.

2. Regularly, or in the case the balance becomes smaller than a pre-defined credit threshold, the decoder performs a *call collection*. During this call:
   - the decoder transmits the *purchase list* of events to the call collector, who forwards it to the SMS, and
   - the call collector resets the credit on the smart card to a predefined value on the call collector.

3. The SMS processes the data and starts a billing procedure in order to invoice the subscriber. The purchase list will also report whether purchased events have been watched or not. This is called the watched criterion. An event is considered as watched as soon as a few seconds have been watched. It is the responsibility of the SMS to decide whether to bill the subscriber for unwatched event

4. The subscriber pays the invoice.

3.1 The role of the credit record in postpaid

In a business model where the operator wants to bill the customer for the events he selects by impulsive purchase, the postpaid IPPV mode relies on the trust that the operator places on its customer. Indeed, the operator can only bill after the customer has watched the events.

The credit exists as a means to limit the amount of events that the customer is allowed to watch between two call collections made by the decoder. As such, the credit on the smart card totally lacks a monetary value.

3.2 Where the real cash resides

In the postpaid IPPV mode the valuable information is the purchase list itself. If the decoder can not report the purchase list for whatever reasons it will not be possible to create a bill for the subscriber. For example, if a customer decides to unplug the decoder from the telephone line then the SMS will never receive the purchase list from the decoder.

Therefore, in the postpaid IPPV mode it is indispensable to have a functional return path from the decoder to the call collector if the purchased events are to be billed eventually. However, the number of events that can be purchased without billing is limited by the initial credit value (credit limit) sent to each individual smartcards.

4. Prepaid IPPV without return path

With the postpaid IPPV feature, the subscribers have the possibility of buying events and are billed afterwards. In some cases, however, the operator might wish to ask the subscribers to pre-pay a certain amount before they have the possibility to impulsively buy and then watch an event. This is the prepaid functionality.

Not using the return path has the clear advantage where a customer does not need to have a telephone line in order to impulsively purchase events. In some countries or regions, the mere lack of telephone lines would simply render the deployment of a prepaid IPPV configuration impossible if decoders were to need a return path.

Another advantage lies in the realm of the marketing area. Some subscribers may be concerned about privacy issues raised by the reporting of watched events. If the decoder does not have a return path then the subscriber has the guarantee that the events he watches will not be reported.

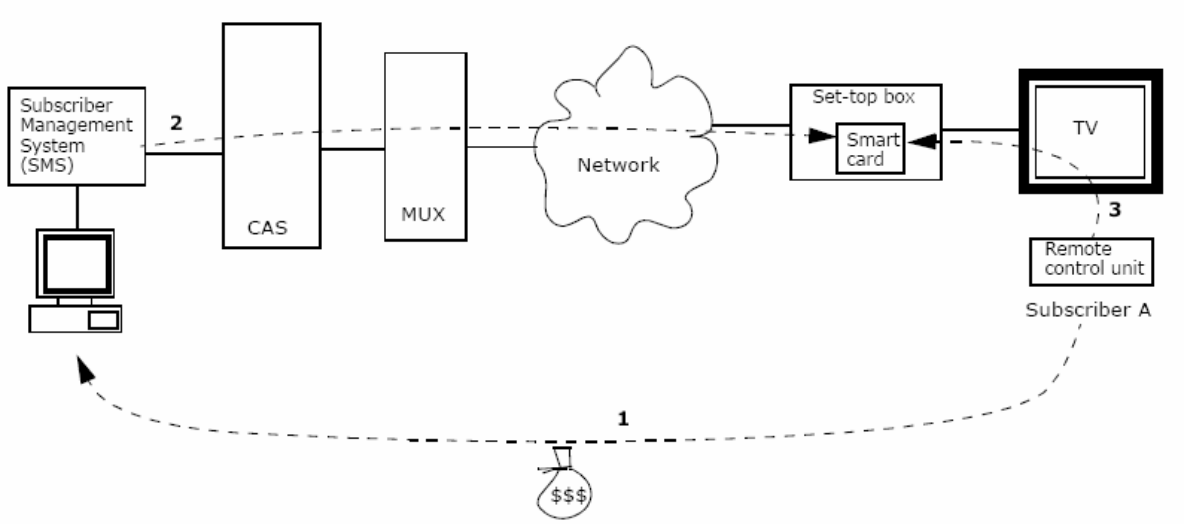

Figure 3: Model for prepaid IPPV without return path mode

This mode relies on the principle where a customer is only allowed to impulsively purchase events as long as there is credit in his smart card. In the typical business model the customer must first pay before being entitled to purchase an event. The usual mode of operation is as follows:

1. The subscriber asks the call-center to be charged a certain sum on his account or credit card for prepaid IPPV purposes.
2. The customer's smart card is credited with the amount that he ordered in (1).
3. The subscriber may now watch events up to the limit of the available credit.
4. Once the available credit it too low, the subscriber must ask the call-center for more credit.

4.1 The role of the credit record

In the prepaid IPPV mode the credit in the smart card is sensitive information. Typically, the credited amount in the smart card would correspond to the amount that the subscriber had paid in advance.

The smartcard manages 2 values: credit and debit.
Credit is the amount of credit sent to the smartcard by the SMS.
Debit is the total value of money spent buying events.

In the prepaid IPPV mode, the SMS is responsible to manage the credit value in the smartcard. That is the SMS must know at all times what is the last value that was sent to a given smartcard in order to add credit the next time.

The example below shows how the credit and debit values work:

#	Operation	Credit	Debit	Balance
1	Empty smartcard	0	0	0
2	Subscriber calls SMS and orders (meaning pays for) a $20 credit	0	0	0
3	SMS sends $20 to the smartcard	20	0	20
4	Subscriber buys one $3 movies	20	3	17
5	Subscriber buys another 5 movies at $3	20	18	2
6	Subscriber cannot buy any more movies for $3.	20	18	2
7	Subscribers calls SMS and orders an additional $20 credit	20	18	2
8	SMS sends **$40** to the smartcard	**40**	18	22

Please note a few important points:

- The debit value always goes up and cannot be changed by the SMS
- The credit value always goes up. It is managed by the SMS.
- The real “credit” available to the subscriber is in fact the balance. Balance = credit-debit.
- These concepts can sometimes be confusing because the STB software usually displays the balance values, but calls it credit

4.2 Limitations and use of the return path

4.2.1 No purchase list available

Content providers may require a proof about how many people has seen a particular event. In this case it is mandatory to gather the purchase lists from the decoders. Not using the return path may have the simple consequence that some content providers are not willing to conduct business with the operator. Using the return path provides the exact information about purchased and watched events.

Please also note that such deployment is less secured than the one using a return path. The events watched cannot be checked and confirmed, which can be a problem for the content owner, or in case of litigation, on the events watched by the subscribers.

One the one side, content owners may not trust the operator without a proper reporting mechanism controlled by the CAS.

On the subscriber side, there may be subscribers trying to call and complain that their credit disappeared or that they didn't watch this or that event. Without a proper reporting system through the CAS, it will be impossible to verify the truth of such claims.

4.2.2 No refund possible

Without a return path, the operator cannot know for sure what movies have been watched or how much credit the subscriber has spent. For that reason, when the subscriber is disconnected, the remaining credit on the smartcard **cannot be refunded** to the subscriber unless the operator puts in place a specific process of visually checking the remaining credit value on the subscriber's STB.

Similarly, in case of a defective smartcard, it will not be possible to check the credit value that was on the smartcard. Nagravision cannot be held responsible for the loss of the credit value on the smartcard.

Depending on the business rule applied by the operator in this case, the operator should consider to only allow relatively small amount of credit to be sent to the smartcard.

5. Prepaid IPPV with return path

This feature gives the operator an extensive flexibility to manage the subscribers' base for impulsive pay-per view (IPPV) events. For example one could imagine having trusted subscribers in the postpaid mode, which means that they would receive an invoice for the watched events, while having other subscribers on a prepaid mode, which would grant them access to IPPV events only if they have enough credit available on their smartcards.

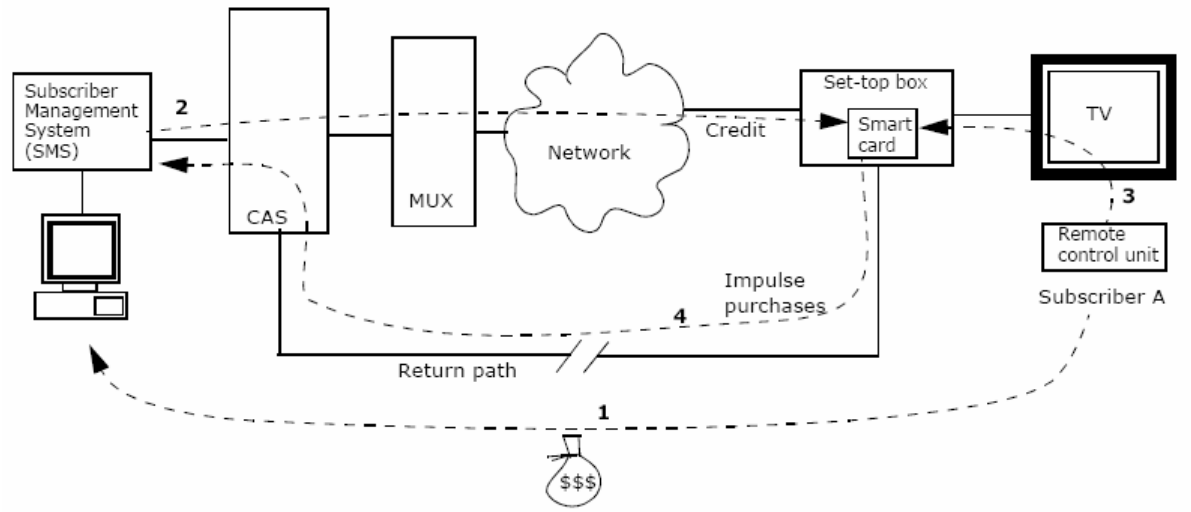

Figure 4: Model for prepaid IPPV with return path mode

This mode is very similar to prepaid IPPV without return path and relies on the principle where a customer is only allowed to impulsively purchase events as long as there is credit in his smart card. In the typical business model the customer must first pay before being entitled to purchase an event. The usual mode of operation is as follows:

1. The subscriber asks the call-center to be charged a certain sum on his account or credit card for prepaid IPPV purposes.
2. The subscriber's smart card is credited with the amount that he ordered in (1).
3. The subscriber may now watch events up to the limit of the available credit.
4. The decoder will perform regular call collections. These call collections are not intended for billing purposes but for providing the operator with information about the customers' event-watching habits. Also, the smart card is **not** recredited with a new amount as in the case of the postpaid IPPV mode. In order to obtain more credit the customer must go to step (1).

The credit management in prepaid with return path is exactly the same as in prepaid without return path.

The callback mechanism in prepaid with return path is exactly the same as in postpaid mode, with the exception that credit isn't send back to the smartcard.

6. Call back mechanism description

The call back is the function used by the set-top box to send information to the CAS over the return path. This information is collected in the Subscriber Authorization System by the Interactive Transaction Manager (ITM) and transmitted to the Subscriber Management System (SMS).

The ITM is the term used for the Nagravision Call Collector.

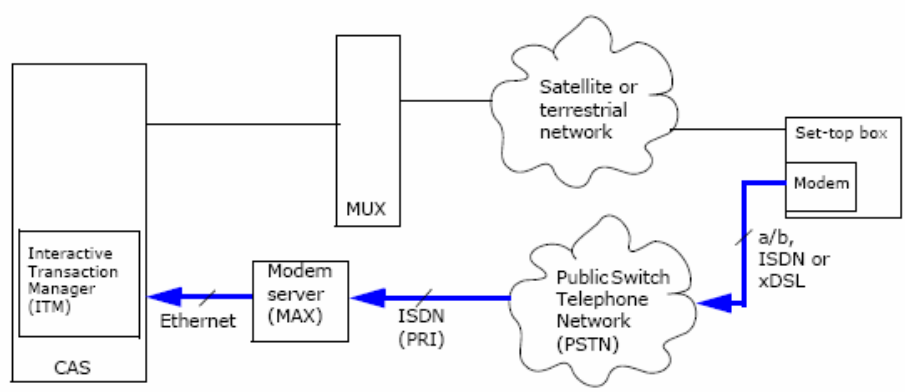

Figure 5: Callback Mechanism

The communication between the Interactive Transaction Manager (ITM) and the set-top box is fully encrypted.

Call Back Types

The different call back types are:

- **Regular**
  The set-top box reports periodically to the SMS, e.g. every month. The call back frequency can be configured in the Subscriber Management System (SMS) per subscriber (the date and time of the next call are maintained in the smart card). The regular call back is used for regular reporting of IPPV events, maintenance and statistical purposes.

- **Immediate**
  The SMS sends a call back request to the set-top box (an Entitlement Management Message (EMM) is sent by the Subscriber Authorization System (SAS)). The set-top box reports to the SMS typically 10 minutes later.

- **Special event**
  If the event the subscriber is watching is marked as a special event, the set-top box reports to the SMS as soon as the event is flagged as "watched". This is used for statistical purposes (viewing reports). The calling times of the set-top boxes can be determined on a random basis in order to balance the load.

- **Low credit (post paid only)**
  The set-top box reports to the SMS when the credit maintained

in the smart card gets down under a predefined limit. The low credit call back never happens in prepaid mode since credit needs to be sent from the SMS.
In postpaid IPPV mode, it allows the smartcard to report the purchases to the call collector. The call collector will then automatically issue more credit to the smartcard so that the balance is back to the original credit limit. The subscriber can then keep buying more IPPV events.

- **Low memory**
  The set-top box reports to the SMS when the memory place available in the smartcard for new entitlements gets down under a predefined limit.

With each call back the impulse purchases are reported.

After a successful call collection the Interactive Transaction Manager (ITM) sends a clean-up command back to the smartcard. The purpose of the clean-up command is to purge expired IPPV records in order to make room for new ones.

After any successful call collection in postpaid mode, the call collector will automatically issue more credit to the smartcard so that the balance is back to the original credit limit.

7. Mixing various PPV and IPPV Modes

As explained in the introduction, technically speaking it is possible to have a mixed set of subscribers in any mode, for example postpaid and prepaid subscribers with a return channel, or prepaid subscribers with and without a return channel, or postpaid and prepaid subscribers with a return channel and prepaid subscribers without it.

It is not, however, possible to switch a subscriber from one mode to another, except by creating a new contract and sending a new smart card.

The reason is that in prepaid mode, the credit on the smartcard represents real money and its remaining value cannot be known to the operator. On the other hand in postpaid mode, the credit on the smartcard in not real money and is only used to trigger a callback after a certain number of purchases. To switch one subscriber from one mode to the other would often mean that the subscriber would either loose or gain some real credit money. Nagravision cannot guarantee the integrity – both on the security and on the operational side – of switching modes for a given subscriber.

7.1 Keep it simple!

Although technically feasible, Nagravision does not recommend mixing all modes at the same time on one system. Instead the operator should carefully study its business plan and identify which modes are required. This allows both the operator and Nagravision to focus on delivering and integrating the best solution for a given business model. This approach has the following advantages:

- Reduce the time-to-market
- Reduce the complexity of the overall system
- Reduce the risks and operational constraints introduced by mixing modes

7.2 Impacts of mixing modes

This chapter provides a list of impacts and other things to look out for when deploying IPPV solutions and mixing modes. It is not an exhaustive list, but aims at helping the operator to make the right decisions on how to move forward.

1) **Increased complexity of the overall system.**

   Each mode brings its own set of specific tests and operational procedures. Since those are specific to how each operator uses the system, some of them have to be developed over time by the operator. The more modes used the more risks of integration and operational problems.

2) **Increased complexity of the SMS.**

   The SMS must know which customer is in which mode and use different commands or sequence of commands for different modes.

   The commands used by the SMS to control smartcards in the various modes are different. A different variation of the SMS-CAS command matrix needs to be defined, implemented and used for each mode.

3) **Increased risk and responsibility on the SMS.**

   The SMS has the responsibility to keep track of the mode and credit values for each card (subscriber) and manage it according to the specific command matrix.
   While the CAS can technically support all modes, it does not have the ability to ensure the consistency of SMS operations. In other words, the CAS cannot detect if the SMS manages correctly the credit on a prepaid card, or by mistakes sends a purge command to a postpaid smartcards and thus deletes records that haven't been billed yet.
   Nagravision can help to design a command matrix that will in theory prevent such mistakes, but the CAS cannot guarantee that mistakes won't happen. As always, the more complex the system, the more risk of operational problems.

4) **Increased complexity of the STB software.**

   The user interface on the STB must be carefully designed if several modes must be supported. The STB software doesn't have a way of knowing which mode (OPPV, postpaid IPPV or prepaid IPPV) it operates unless a specific IRD commands is designed to this effect. Some of the questions to answer might be:

   How are normal PPV presented to the user?
   How are IPPV presented to the user?
   How does the subscriber understand whether he/she has to order credit or confirm IPPV purchase directly on the STB?

5) **Maintain one mode per household.**

Nagravision recommends that in the case of several STB in one household, all the STB in the same household should operate in the same mode. This is not a strict technical requirement, but design to avoid user confusion in the buying habit.

6) **Increased complexity of the clean-up (purge) process.**

Old PPV and IPPV records on the smartcards must be cleaned-up in order to make room for new ones. If only one mode is used, the clean-up is generally simple. Either it happens automatically during callback or automatically with a global clean-up EMM.
However, when various modes are mixed, the process becomes more complex. Automatic global clean-up is no longer possible and the responsibility falls on the SMS to issue clean-up commands selectively to each smartcards depending on their mode.
Chapter 8 will describe the process in more details

7) Increased EMM bandwidth.

Per example, when prepaid with and without return modes are mixed, manual commands have to periodically be sent to each "prepaid without return path" smartcards in order to manually mark their records as "call collected" before they can be purged.
A direct consequence of using manual clean-up commands will be an increase on the number of EMMs on the system and may require an increase in EMM bandwidth needed.

8) **Increased complexity of recycling process**

Part of the smartcard recycling process, if implemented by the operator, can include initiating an immediate callback to retrieve the last IPPV records and later reset the credit values to zero.
But for smartcards without return path, the process is different. Here to, the SMS and the operators performing these steps must apply different procedures depending on the mode.

This list of possible impacts is designed to share Nagravision's extensive experience in integrating Pay-TV systems and help the operator to make the proper decisions.

While mixing modes can be supported, it doesn't always come for free for the operator in terms of integrating and operating costs in the long run.

8. Clean-up of PPV and IPPV records

This chapter provides an overview of how the old PPV/IPPV records on the smartcard can be purged in order to make room for new ones.

8.1 Record purging tools

The following list presents the tools and mechanisms available. Their use depends on what prepaid or postpaid modes need to be supported.

1. **Automatic, during callback**

   At the end of any successful callback, the call collector will issue a purge command to the smartcard. This will purge any PPV or IPPV that is marked as **reported** and **expired for more than x days (configurable)**.

2. **Automatic Global Cleanup (a global EMM)**

   This is a process, running on the CAS, periodically sending a global EMM to all smartcards. This EMM purges any PPV/IPPV marked as **reported** and **expired for more than x days (configurable)**.

   This cleanup process is active on any system supporting OPPV.

3. **SMS Cmd 97: Manual Set IPPV Records as Reported**

   The SMS uses this command to set some IPPV records on a given smartcard as reported. This command should be used to address ONLY decoders working in prepaid without return path mode.

   Typically this command is sent either periodically to each smartcard in that mode or at any time the subscriber requests more credit.

4. **SMS Cmd 96: Manual Purge PPV and IPPV Records**

   This command purges all PPV/IPPV on a specific smartcard when the record is **reported** and **expired for more than x days (configurable)**.

These tools and commands are either used alone or in combination depending on which modes co-exist on the system. The dependencies for a record to be purged are always which records are expired and which records are reported. The following 2 chapters explain these dependencies.

8.2 Product expiry and purge date

The following rules usually apply with regards to records expiry:

- The expiry of a record on the smartcard corresponds to the end_date value of the corresponding product in the CAS database.
- Also, the end_date of a typical single event product is not the end of the event. This is to allow last minute rescheduling of an event without having to change the product. Typically, the end_date of a single event product is 1 day after the end of the event.
- The product validity end_date is inclusive. The product is expired the day after that.
- Only the UTC date – and not the time – is stored in the smartcard.

Following these rules, we can show the following example:

- An event finishes at 14:00hours, Singapore time, on April 13.
- The event_end_time is 06:00, April 13 UTC
- The end_date of the product April 14 UTC
- The product will be expired (can be purged) on April 15 UTC.
- In Singapore (GMT+8), the product will be considered as expired, and therefore can be purged, at 8am on April 15.

8.3 The “reported” or “call collected” flag

Once it is clear which records are expired or not, the only remaining question for which record will be purged is the “reported” or “call collected” flag. The goal is to **make sure that the reported flag is set at the right time**.

Since OPPV can be supported on most systems, let us assume that a global clean-up EMM is running. This means that any record that is expired for more than x days and reported will be purged. Then we can explore each mode and describe what other mechanism should be used.

1. **OPPV**

   PPV (OOPV) are automatically marked as reported when they are sent to the smartcard. Therefore these will be purged by the global cleanup after they expire.

2. **Postpaid IPPV**

   The IPPV in postpaid mode are not flagged as reported when the IPPV is purchased. However, they will be flagged as reported after a successful callback and then purged.
   The important thing is for SMS to make sure to NOT send any Cmd97 (Manual Set IPPV as reported) to these cards or the revenue for these IPPV records will be lost.

3. **Prepaid IPPV without path**

   Case A: If prepaid without return path is the only mode used on the system, the CAS (crypt_iemm process) can be configured in order to mark all IPPV as reported during their creation (since there is no return path anyway). If this setting is active, the IPPV records will be automatically urged by the global cleanup after they expire.

   Case B: if some mode with return path (prepaid or postpaid) is also supported on the system, then IPPV records cannot be set as reported during their creation. In that case, the SMS needs manually send Cmd97 (Manual Set IPPV as reported) to each smartcard in prepaid mode without return path every time the subscriber requests more credit.

4. **Prepaid IPPV with return path**

   Similar to postpaid IPPV. The IPPV in prepaid with return path mode are not flagged as reported when the IPPV is purchased. However, they will be flagged as reported after a successful callback and then purged.
   The important thing is for SMS to make sure to NOT send any Cmd97 (Manual Set IPPV as reported) to these cards or the report for these IPPV records will be lost.

8.4 General notes on credit management

In both prepaid and postpaid mode, it is important to give some thought to the credit limit allowed for each subscriber group. Here are some general guidelines

8.4.1 Postpaid mode

In postpaid mode, the credit value (and the credit limit defined on the call collector) define, on average, how many IPPV records can be purchased before the smartcard is forced to callback. The following rules can be used:

- The credit value should allow to purchase at least 3-5 PPV events so as to not force too frequent callbacks.

Per example, if the average event price is $3, the credit limit could be set at around $15-$20. This allows users to purchase on average up to 6 movies without any callback.

These values could depend on the buying habits of subscribers on a particular network. On average, operator can hope for 2-3 buy/month.

With a capacity of 6 buys before low credit, and assuming a monthly regular callback, this setup will make low credit calls the exception rather than the rule, which is what is desired.

- The threshold value should be set to half the credit limit, but half the credit limit should at least allow to purchase the most expensive IPPV on offer. Otherwise, the trigger for a low credit callback will happen “too late”.

Now let’s consider the same example as earlier and use a credit threshold of $10. This seems a reasonable value. After the 4th buy, the credit balance will go from $12 to $9, therefore triggering a low credit callback. There is still time for the callback to happen since the subscriber can still purchase 2 more movies before really running out of credit.

But now let’s consider that there is also some very special sporting event on the network that sells for $15. After 3 movie purchases, the balance will be down to $12. This is not low credit yet, but not enough to purchase the expensive sporting event. This case could create a lot of calls to the call center on the night of the event.

8.4.2 Prepaid mode

In prepaid mode, the credit value sent to the smartcard represents real money and cannot be refunded. As explained earlier, there is a small risk that this money can be lost when a subscriber disconnects or in the case of a defective smartcard. For this reason, the operator should not allow very big amounts of credit to be purchased at one time.

In prepaid with no return path mode, if the amount of credit purchased gives access to an average of more than 30 IPPV products, then the process of sending a manual purge command every time the user requests more credit may not be sufficient. In that case, the SMS should plan to send a periodic manual purge command.

Glossary, terms and acronyms

ACS	*Access Control System*; Nagravision component translating SMS commands into EMMs
ASE	*Available Server Environment*; Compaq UNIX mechanism providing redundancy between a cluster of two identical machines. Used by the main CAS machines in redundant architectures
ASI	*Asynchronous Serial Interface*; protocol to interconnect DVB equipment
CA	*Conditional Access*; equipment and techniques preventing unauthorized use of data or video streams.
CAK	*Conditional Access Kernel*; Nagravision component running on the Consumer Device (or STB) and providing an interface to the security chip
CAS	*Conditional Access System*; Nagravision product, as a whole
CC	*Call Collector*; Nagravision component handling the calls from the STB to collect IPPV usage
CMS	*Content Management System*; software to manage all aspects linked to content (acquisition, scheduling, broadcasting, payments) for a Pay TV operator
DNASP	*Digital Nagravision Advanced Security Processor*; name of the Nagravision CA technology
DVB	*Digital Video Broadcasting*; Consortium of companies establishing common international standards for digital broadcasting. <http://www.dvb.org/>
DVB-CI	DVB Common Interface; optional digital removable security devices implementing the security and CA portions of STB in the DVB standard, functionally equivalent to the US OpenCable POD standard
ECB	Nagravision hardware device combining and ECE, EMB and EME.
ECM	*Entitlement Control Message*; CA message
ECMG	*ECM Generator*; In the context of DVB SimulCrypt, generic name given to the CA specific device or software generating ECMs.
ECO	*Engineering Change Order*; In general, procedure designed to document as precisely as possible a change in a system. Specifically, procedure by which Nagravision customers can request specific modifications to their CAS.
ECS	*ECM SimulCrypt Encryptor*; Nagravision component providing ECMs to the network; acts as a DVB SimulCrypt ECMG
EIS	*Event Information Scheduler*; In the DVB SimulCrypt system architecture, functional unit in charge of holding all the schedule information, all the configurations and CA specific information required for the complete system.
EIT	*Event Information Table*; part of the DVB SI specification
EMB	*EMM Broadcaster*; Nagravision component providing EMMs to the network; acts as a DVB SimulCrypt EMMG
EME	*EMM Encryptor*; Nagravision component encrypting EMMs before diffusion by the EMB
EMM	*Entitlement Management Message*; CA message
EMMG	*EMM Generator*; In the context of DVB SimulCrypt, generic name given to the CA specific device of software generating EMMs.
EPG	*Electronic Program Guide*; depending on the context, refers either to the STB application providing a display of the channel schedule on the subscriber TV screen, or either to the whole schedule process, from its definition, its transmission on the network to its display.
FTTH	*Fiber To The Home*; Network architecture
GUI	*Graphical User Interface*; a computer program human interface that takes advantage of the computer's graphic capabilities to make the program easier to use

IMS	*Information Management System*; Nagravision component handling the topology, schedule, and subscriber offerings (products)
IP	*Internet Protocol*
ISDN	*Integrated Services Digital Network*; set of international standards for transmitting voice, data, and video simultaneously
ISO	*International Standard Organization*
MDI	*Multimedia Data Injector*; Nagravision component streaming data or video over ATM or DVB equipment
MGT	*Management Workstations*; Nagravision supplied Windows NT computers designed to run a suite of GUIs to monitor and control the CAS
MMDS	*Multipoint Microwave Distribution System*; Wireless broadband network technology
MPEG	*Moving Picture Experts Group*; ISO working group. The term also refers to the family of digital video compression standards and file formats developed by the group
MPEG-2	MPEG second video compression scheme; coding scheme for the compression of video signals
MUX	*Multiplexer*;
Nagravision	*Nagravision S.A.*; member of the Kudelski Group of Companies, provides this document and the solutions, components or APIs it describes
NIT	*Network Information Table*; part of the DVB SI specification
NVOD	*Near Video On Demand*; principle by which the same movie or event is repeated on multiple channels at short intervals like 15 minutes
PSI	*Program Specific Information*; MPEG specifications enabling auto-tuning on the STB
SC	*Smart Card*;
SCS	*SimulCrypt Synchronizer*; In the DVB SimulCrypt architecture, logical component that acquires CW, ECMs and synchronizes their play-out for all the CA systems connected
SDT	*Service Definition Table*; part of the DVB SI specifications
SI	*System Information*; DVB or ATSC defined data format used by the STB to display information about services available on the network
SIG	*SI Generator*; In the DVB SimulCrypt architecture, component responsible for generating the SI, taking its primary data from the EIS and supplementary data from the Custom SI servers supplied by the CA providers.
SMS	*Subscriber Management System*; software program managing subscribers on the network; may be supplied by Nagravision
STB	*Set Top Box*; name of the Consumer Device in DTV networks
TCP	*Transmission Control Protocol*; main protocols in IP networks; enables two computers to establish a connection and exchange streams of data; guarantees delivery of data
TDT	*Time Definition Table*; part of the DVB SI specifications
TOT	*Time Offset Table*; part of the DVB SI specifications
VOD	*Video On Demand*; umbrella term for a wide set of technologies whose common goal is to enable individuals to select video streams from a central server for viewing on a television or computer screen
XML	*eXtensible Markup Language*; a pared-down version of SGML; allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations. Nagravision uses XML for most of its APIs.