Genpix BDA Driver (Extended)

Implementation Guidelines for Applications

I. GUID for Extended property of Genpix BDA Driver

```
// PropertySet GUID
DEFINE_GUIDSTRUCT( "DF981009-0D8A-430e-A803-17C514DC8EC0", KSPROPERTYSET_TunerControl );
#define KSPROPERTYSET_TunerControl DEFINE_GUIDNAMED( KSPROPERTYSET_TunerControl )
```

II. Extended Property List (three extra functions)

```
// PropertySet Commands
typedef enum
{
      KSPROPERTY_SET_FREQUENCY,
      KSPROPERTY_SET_DISEQC,
      KSPROPERTY_GET_SIGNAL_STATS

} KSPROPERTY_TUNER_COMMAND;
```

III. Enumeration for switch input selection

```
// Port switch selector
typedef enum
{
      None = 0,
      PortA = 1,
      PortB = 2,
      PortC = 3,
      PortD = 4,
      BurstA = 5,
      BurstB = 6,
      SW21_Dish_1 = 7,
      SW21_Dish_2 = 8,
      SW42_Dish_1 = 9,
      SW42_Dish_2 = 10,
      SW44_Dish_2 = 11,
      SW64_Dish_1A = 12,
      SW64_Dish_1B = 13,
      SW64_Dish_2A = 14,
      SW64_Dish_2B = 15,
      SW64_Dish_3A = 16,
      SW64_Dish_3B = 17,
      Twin_LNB_1 = 18,
      Twin_LNB_2 = 19,
      Quad_LNB_2 = 20

} DiSEqC_Port;
```

As you can see in enumeration above, many types of switches are supported:
Committed Diseqc, mini-Diseqc (tone-burst), and several legacy switches (voltage controlled switches).
Uncommitted Diseqc switches can be supported through Raw Diseqc Command (`KSPROPERTY_SET_DISEQC`)

IV. Tuner Command Structure

```
typedef struct _TUNER_COMMAND
{
      ULONG FrequencyMhz;
      ULONG LOFLowMhz;
      ULONG LOFHighMhz;
      ULONG SwitchFreqMhz;
      ULONG SymbolRateKsps;
      Polarisation SignalPolarisation;
      ModulationType Modulation;
      BinaryConvolutionCodeRate FECRate;
      DiSEqC_Port DiSEqC_Switch;

      UINT DiSEqC_Repeats;

      UINT DiSEqC_Length;
      UCHAR DiSEqC_Command[8];
      BOOL ForceHighVoltage;

      UINT StrengthPercent;
      UINT QualityPercent;
      BOOL IsLocked;

} TUNER_COMMAND, *PTUNER_COMMAND;
```

For simplicity, all three extended BDA functions use the very same TUNER_COMMAND structure.
But each function uses only some members of this structure (and ignores other members).
Thus, tuner command block can be re-used between all extended BDA functions.

Description of the members of TUNER_COMMAND structure:

FrequencyMhz, LOFLowMhz, LOFHighMhz, and SwitchFreqMhz are self explanatory.
Tone-signal (22kHz signal) is generated by the driver based on relations between these values:
If (FrequencyMhz < SwitchFreqMhz), tone is off and LOFLowMhz is used as a LOF value.
If (FrequencyMhz > SwitchFreqMhz), tone is ON and LOFHighMhz is used as a LOF value.
One exception:
If SwitchFreqMhz = DishProLnb (defined as 20000), tone is always off, and LOFLowMhz and LOFHighMhz are treated as LOFs of bandstacked LNB (aka DishPro LNB):
LOFLowMhz is used for all transponders with Right/Vertical polarization
LOFHighMhz is used for all transponders with Lefy/Horizontal polarization

SignalPolarization is based on definitions of Polarisation in <bdatypes.h>.

Modulation is based on definitions of ModulationType in <bdatypes.h>.
The following values can be used to select Modulation type:

BDA_MOD_QPSK	(DVB QPSK)
BDA_MOD_16QAM	(Turbo-FEC QPSK)
BDA_MOD_8PSK	(Turbo-FEC 8PSK)
BDA_MOD_DIRECTV	(DSS QPSK)
BDA_MOD_32QAM	(Digicipher II Combo)
BDA_MOD_64QAM	(Digicipher II Split (I))
BDA_MOD_80QAM	(Digicipher II Split (Q))
BDA_MOD_96QAM	(Digicipher II Offset QPSK)

Everything else is treated as DVB QPSK by the driver.

FECRate is based on definitions of BinaryConvolutionCodeRate in <bdatypes.h>.
AutoFEC can not be used with Turbo-FEC modulations, you have to set FEC rate explicitly.

DiSEqC_Switch describes one of the port inputs (different switch types).

DiSEqC_Repeats indicates how many times Diseqc command is re-sent.
Repeats = N means that (N+1) identical commands would be sent. Driver does not send more than 9 repeats.

Next three members are used for Raw Diseqc command only (KSPROPERTY_SET_DISEQC).
They are ignored by all other Custom BDA commands.

DiSEqC_Length – length of Raw Diseqc command
DiSEqC_Command – Diseqc command Frame (up to 8 bytes).
ForceHighVoltage – High LNB voltage flag. If set, Diseqc command would be sent at the 18V level. Otherwise, current LNB voltage would be used. This flag is helpful when DishProPlus switches are used (they don't work properly at 13V level).

Next three members are returned values (they are self explanatory):
StrengthPercent, QualityPercent, IsLocked.
They are updated by Tune (KSPROPERTY_SET_FREQUENCY) and Get Signal Statistics (KSPROPERTY_GET_SIGNAL_STATS) commands.

V. Operation:

All samples below assume that TUNER_COMMAND structure is already created.

1) Tuning Command (KSPROPERTY_SET_FREQUENCY):
Set all the members from FrequencyMhz to DiSEqC_Repeats.
(DiSEqC_Length, DiSEqC_Command, and ForceHighVoltage are ignored by this function).
Issue (KSPROPERTY_SET_FREQUENCY) command.
Upon execution, StrengthPercent, QualityPercent, IsLocked would be populated (if no lock was achieved, StrengthPercent and QualityPercent would be zero).
During execution, Port selection command (based on DiSEqC_Switch) would be sent just before tuning attempt.
DiSEqC_Repeats is applicable to diseqc switches only (legacy commands are not repeated).

2) Raw Diseqc Command (KSPROPERTY_SET_DISEQC)
Set all the members from DiSEqC_Repeats to ForceHighVoltage (all other members are ignored by this function).
Issue (KSPROPERTY_SET_DISEQC) command.

This command can be used to send a mini-Diseqc command as well:
Set DiSEqC_Length = 0, then DiSEqC_Command[0] would be treated as mini-Diseqc (0 = BurstA, 1 = BurstB).

3) Get Signal Statistics Command (KSPROPERTY_GET_SIGNAL_STATS)
No initial settings of any structure members is required.
Issue (KSPROPERTY_GET_SIGNAL_STATS) command.
Upon execution the following members are get updated with current signal status.
StrengthPercent,
QualityPercent,
IsLocked,
FrequencyMhz (it returns the actual frequency achieved after auto-frequency adjustments by the tuner).

4) This driver optionally supports the Windows 7 © IBDA_DiseqCommand interface
(see http://msdn.microsoft.com/en-us/library/dd693308(VS.85).aspx).
get_DiseqResponse is the only function which is not supported.

5) Driver does support tuning via standard BDA commands. Custom Tuning Command (one of these three described above) may reduce the clutter of your DVB application code.