



Grandstream XML Application Guide

Three XML Applications

PART A – Application Explanations

PART B – XML Syntax, Technical Detail, File Examples

Grandstream XML Application Guide - PART A

Three XML Applications

Grandstream GXP Series supports both simple and advanced XML applications. Part A of this application note will describe Grandstream's XML applications: 1) XML Custom Screen, 2) XML Downloadable Phonebook and 3) Advanced XML Survey Application.

WHAT IS XML?

XML is a markup language* for documents and applications containing structured information. This information contains both content (words, pictures, etc.) and an indication of what role that content plays (e.g. content in a section heading is different than content in a footnote, which is different than content in a figure caption or content in a database table, etc.). Almost all documents have some structure.

* A markup language is a mechanism to identify structures in a document. The XML specification defines a standard way to add markup to documents.

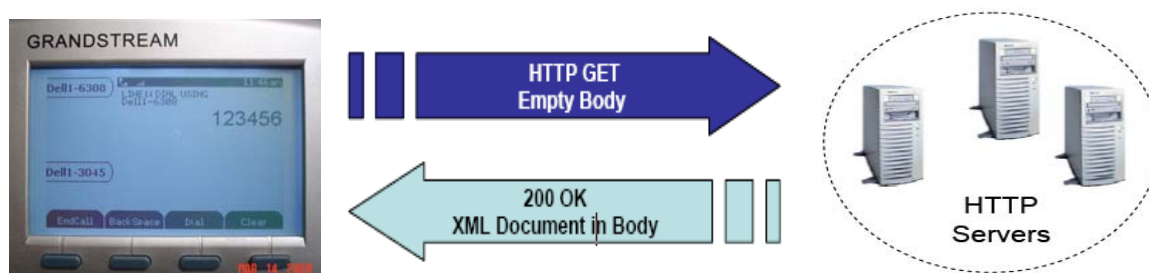
WHY XML?

What benefits does XML provide to SIP endpoints? XML enables our SIP phones to serve as output devices for many exciting applications. The XML infrastructure allows our phones to interact with external applications in a flexible and programmable manner. Three specific XML applications supported by Grandstream include *XML Custom Screen*, *XML Phonebook*, and *XML Survey Application*. The last application is a custom application where the XML framework is an interactive, real-time implementation and XML messaging is dynamic, depending on a configurable object set.

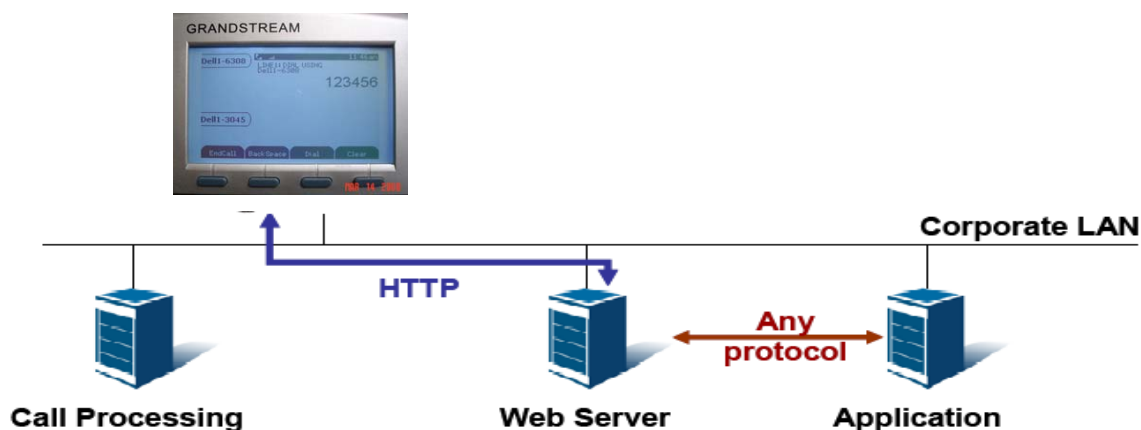
XML ARCHITECTURE

XML applications can be initiated in several ways.

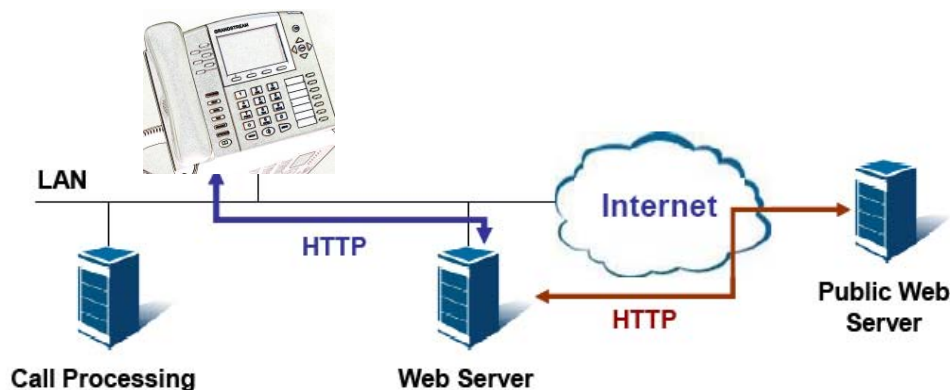
1. The first architecture is if the phone initiates a request for a service. In this instance, the GXP will receive a 200 OK with a XML document as its content.



2. The second architecture is in a closed network. An application in a closed network may exchange information in the following manner:



3. A third architecture enables the internal web server to interact with outside web server via HTTP.



As illustrated above, all of the application logic lies within the server side of the architecture. This allows faster applications development and minimal phone side maintenance. Users may develop *customized applications* using this infrastructure.

XML CUSTOM SCREEN APPLICATION

The GXP Series supports idle screen customization. The design and layout of the LCD screen is customer dependent. The following API configuration will work with all GXP Series models.

CUSTOM SCREEN API CONFIGURATION

The XML Custom Screen API is configurable in 2 steps:

1. **Enable Idle Screen XML Download** (P340): NO/YES-HTTP/YES-TFTP (default NO). Possible values 0 (NO)/1 (HTTP)/2 (TFTP), other values ignored.
2. **Idle Screen XML Server Path** (P341): This is a string of up to 128 characters that contains a path to the XML file. It must follow the host/path format. **i.e.** "directory.grandstream.com/engineering"

The XML feature is activated when "Enable Idle Screen XML Download" is set to **YES** (HTTP or TFTP) and a valid "Idle Screen XML Server Path" is set.

To download or erase the XML file, the following 2 options should be selected in the **Preference LCD GUI** submenu:

- Download SCR XML
- Erase Custom SCR

Select the *Download SCR XML* using the Preference Keypad menu to start the download process. The phone will download the *gs_screen.xml* file specified in "Idle Screen XML Server Path". The XML application is effective immediately after download. Save the file for future use.

NOTE: GXP2020 supports custom Idle Screen file name. For other GXPs, the Idle Screen file name is fixed and cannot be changed based on personal preference.

XML PHONEBOOK APPLICATION

The GXP Series supports a downloadable phonebook with up to 500 entries. This application can also be used in large organizations where there is a central directory server so employees can efficiently download the most current directories.

NOTE: As of April 2008 Grandstream Networks is working on a solution to be able to download phonebooks that are 100+ entries large. The phones currently only support 500 entries if they are entered manually. As a recommendation we suggest all XML phonebooks to be limited to 100 entries for the time being.

The following Phonebook API configuration will work with all GXP Series models.

PHONEBOOK API CONFIGURATION

The XML Custom Screen API is configurable in 4 steps:

1. **Enable Downloadable Phonebook (P330):** NO/YES-HTTP/YES-TFTP (default NO). Possible values 0 (NO)/1 (HTTP)/2 (TFTP), other values ignored.
2. **Phonebook XML Path (P331):** This is a string of up to 128 characters that contains a path to the XML file. It must follow the host/path format. i.e. "directory.grandstream.com/engineering"
3. **Phonebook Download Interval (P332):** This field sets the time interval to download the phonebook (in hours) automatically. Valid value range is 0-720 (default 0).
4. **Remove manually remove edited entries on download:** YES/NO (default NO) P333, possible values 0/1, other values ignored.

The XML phonebook feature is activated when "Enable Downloadable Phonebook" is set to **YES** (HTTP or TFTP) and a valid "Phonebook XML Path" is set.

The phone will download the *gs_phonebook.xml* file specified in "Phonebook XML Path". The XML application is effective immediately after download. Save the file for future use. During this process the LCD will display a message to indicate the XML Phonebook download is in progress.

NOTE:

- The phonebook file name is fixed and cannot be changed based on personal preference.
- If the "Phonebook Download Interval" is set to a non-zero value x, the phonebook is automatically updated every x hours.
- If the "Remove manually edited entries on download" option is set to **No** (by default), the phone will keep ALL previously stored phonebook entries, insert the downloaded phonebook entries, and then save the phonebook. If set to **Yes**, the downloaded phonebook entries will replace the existing phonebook stored on the phone.
- At any time, you can immediately download the phonebook by choosing the "**Download Phonebook**" in the GUI Phone Book Menu (you can use the down arrow key when the phone is on-hook).

Grandstream XML Application Guide - PART B

XML Syntax, Technical Detail, File Examples

Part B of this application note will guide you through the technical details of our three applications: 1) XML Custom Screen, 2) XML Downloadable Phonebook and 3) Advanced XML Survey Application.

Application One: XML Custom Screen Details

XML CUSTOM SCREEN SYNTAX

XSD FILE

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="Screen">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="IdleScreen" minOccurs="1" maxOccurs="1">
          <xs:complexType>
            <xs:sequence>
              <!-- The ShowStatusLine element is now optional and default to false. Ignored by GXP2020 -->
              <xs:element name="ShowStatusLine" type="xs:boolean" minOccurs="0" maxOccurs="1"
default="false"/>

              <xs:element name="DisplayBimap" type="BimapType" minOccurs="0" maxOccurs="unbounded"
nilable="true"/>

              <xs:element name="DisplayString" type="StringType" minOccurs="0" maxOccurs="unbounded"
nilable="true"/>

              <!-- The DisplaySoftKey element apply only to GXP-2020/2010 and is ignored by GXP-2000 -->
              <xs:element name="DisplaySoftKey" type="SoftKeyType" minOccurs="0" maxOccurs="12"
nilable="true"/>

              <!-- The UseDefaultSoftKeys element apply only to GXP-2020/2010 and is ignored by GXP-2000
If it is missing by default it is false, when it is true, any DisplaySoftKey elements
would be ignored and the system default softkeys would apply -->
              <xs:element name="UseDefaultSoftKeys" type="xs:boolean" minOccurs="0" maxOccurs="1"
default="false"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

  <xs:complexType name="BimapType">
    <xs:sequence>
      <xs:element name="Bimap" type="xs:base64Binary" minOccurs="1" maxOccurs="1"/>
      <xs:element name="X" type="xs:integer" minOccurs="1" maxOccurs="1" default="0"/>
      <xs:element name="Y" type="xs:integer" minOccurs="1" maxOccurs="1" default="0"/>

      <!-- The new element displayCondition deprecates the old attribute alreg.
If displayCondition is found alreg will be ignored.
The old attribute alreg is kept for backward compatibility -->
      <xs:element name="displayCondition" type="IdleScreenConditionType" minOccurs="0" maxOccurs="1"
nilable="true"/>
    </xs:sequence>

    <!-- This attribute is deprecated, please use the displayCondition element instead -->
    <xs:attribute name="alreg" type="xs:boolean"/>
  </xs:complexType>

  <xs:complexType name="StringType">
    <xs:sequence>
      <xs:element name="DisplayStr" type="xs:string" minOccurs="1" maxOccurs="1" />
      <xs:element name="X" type="xs:integer" minOccurs="1" maxOccurs="1" default="0"/>
      <xs:element name="Y" type="xs:integer" minOccurs="1" maxOccurs="1" default="0"/>

      <!-- The new element displayCondition deprecates the old attribute alreg.
If displayCondition is found alreg will be ignored.
The old attribute alreg is kept for backward compatibility -->
      <xs:element name="displayCondition" type="IdleScreenConditionType" minOccurs="0" maxOccurs="1"
nilable="true"/>
    </xs:sequence>

    <!-- This attribute is deprecated, please use the displayCondition element instead -->
    <xs:attribute name="alreg" type="xs:boolean"/>

    <xs:attribute name="font" default="f8">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="f8"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
  </xs:complexType>
</xs:schema>
```

```

<xs:enumeration value="f10"/>
<xs:enumeration value="f13h"/>
<xs:enumeration value="f13b"/>
<xs:enumeration value="f16"/>
<xs:enumeration value="f16b"/>
<!-- c suffix fonts are Comic fonts -->
<xs:enumeration value="f18c"/>
</xs:restriction>
</xs:simpleType>
</xs:attribute>

<xs:attribute name="align" default="Left">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:enumeration value="Left"/>
      <xs:enumeration value="Center"/>
      <xs:enumeration value="Right"/>
    </xs:restriction>
  </xs:simpleType>
</xs:attribute>

<xs:attribute name="valign" default="Top">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:enumeration value="Top"/>
      <xs:enumeration value="Center"/>
      <xs:enumeration value="Bottom"/>
    </xs:restriction>
  </xs:simpleType>
</xs:attribute>

</xs:complexType>

<xs:complexType name="IdleScreenConditionType">
  <xs:sequence>
    <xs:element name="conditionType">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="alwaysDisplay"/>
          <xs:enumeration value="a1reg"/>
          <xs:enumeration value="a2reg"/>
          <xs:enumeration value="a3reg"/>
          <xs:enumeration value="a4reg"/>
          <xs:enumeration value="a5reg"/>
          <xs:enumeration value="a6reg"/>
          <xs:enumeration value="a1voiceMsg"/>
          <xs:enumeration value="a2voiceMsg"/>
          <xs:enumeration value="a3voiceMsg"/>
          <xs:enumeration value="a4voiceMsg"/>
          <xs:enumeration value="a5voiceMsg"/>
          <xs:enumeration value="a6voiceMsg"/>
          <xs:enumeration value="missCall"/>
          <xs:enumeration value="callFwded"/>
          <xs:enumeration value="dnd"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
  </xs:sequence>

  <!-- The optional negate element negates the evaluated result to create opposite behavior -->
  <xs:attribute name="negate" type="xs:boolean" default="false"/>
</xs:complexType>

<xs:complexType name="SoftKeyType">
  <xs:sequence>
    <xs:element name="KeyLabel" minOccurs="1" maxOccurs="1">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:minLength value="1"/>
          <xs:maxLength value="32"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>

    <xs:element name="KeyAction" minOccurs="1" maxOccurs="1">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <!-- the UseURL option will also require the URL element and is not used now -->
          <xs:enumeration value="UseURL"/>
          <xs:enumeration value="NewCall"/>
          <xs:enumeration value="FwdAll"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```



```

<xs:enumeration value="Cancel Fwd"/>
<xs:enumeration value="MissedCalls"/>
<xs:enumeration value="Call Return"/>
<xs:enumeration value="PhoneBook"/>
<xs:enumeration value="MainMenu"/>
<xs:enumeration value="VoiceMail"/>
</xs:restriction>
</xs:simpleType>
</xs:element>

<xs:element name="displayCondition" type="IdleScreenConditionType" minOccurs="0" maxOccurs="1"
nilable="true"/>
</xs:sequence>
</xs:complexType>
</xs:schema>

```

EXAMPLE IDLE SCREEN SAMPLE FILE

EXAMPLE 1

```
<?xml version="1.0"?>
<!-- This file creates identical result to GXP-2000 default behavior -->
<Screen>
  <IdleScreen>
    <ShowStatusLine>true</ShowStatusLine>
    <DisplayString font="f8">
      <DisplayStr>$W, $M $d</DisplayStr>
      <X>0</X>
      <Y>0</Y>
    </DisplayString>
    <DisplayString font="f13h" hal ign="Center" a1reg="false">
      <DisplayStr>$N</DisplayStr>
      <X>65</X>
      <Y>12</Y>
    </DisplayString>
    <DisplayString font="f13b" hal ign="Center" a1reg="true">
      <DisplayStr>$N</DisplayStr>
      <X>65</X>
      <Y>12</Y>
    </DisplayString>
    <DisplayString font="f13h" hal ign="Center" a1reg="false">
      <DisplayStr>$X</DisplayStr>
      <X>65</X>
      <Y>26</Y>
    </DisplayString>
    <DisplayString font="f13b" hal ign="Center" a1reg="true">
      <DisplayStr>$X</DisplayStr>
      <X>65</X>
      <Y>26</Y>
    </DisplayString>
    <DisplayString hal ign="Center" val ign="Bottom">
      <DisplayStr>$I</DisplayStr>
      <X>65</X>
      <Y>48</Y>
    </DisplayString>
  </IdleScreen>
</Screen>
```

EXAMPLE 2

```
<?xml version="1.0"?>
<!-- The example shows how to program the softkeys for GXP-2020/2010 -->
<Screen>
  <IdleScreen>
    <DisplayBimap>
      <Bimap>///// </Bimap>
      <X>0</X>
      <Y>0</Y>
    </DisplayBimap>
    <DisplayString font="f8">
      <DisplayStr>$W, $M $d</DisplayStr>
      <X>0</X>
      <Y>0</Y>
    </DisplayString>
    <DisplayString font="f13h" hal ign="Center" a1reg="false">
      <DisplayStr>$N</DisplayStr>
      <X>70</X>
      <Y>12</Y>
    </DisplayString>
    <DisplayString font="f13b" hal ign="Center" a1reg="true">
      <DisplayStr>$N</DisplayStr>
      <X>70</X>
      <Y>12</Y>
    </DisplayString>
    <DisplayString font="f13h" hal ign="Center" a1reg="false">
      <DisplayStr>$X</DisplayStr>
      <X>70</X>
      <Y>26</Y>
    </DisplayString>
    <DisplayString font="f13b" hal ign="Center" a1reg="true">
      <DisplayStr>$X</DisplayStr>
      <X>70</X>
    </DisplayString>
  </IdleScreen>
</Screen>
```

```

        <Y>26</Y>
    </DisplayString>
    <DisplayString hal ign="Center" val ign="Bottom">
        <DisplayStr>$I</DisplayStr>
        <X>70</X>
        <Y>48</Y>
    </DisplayString>

    <SoftKeys>
        <SoftKey>
            <Label>New Cal I</Label>
            <Action>
                <NewCal I />
            </Action>
        </SoftKey>

        <SoftKey>
            <Label>Mi ssed Cal I s</Label>
            <Action>
                <Mi ssedCal I s/>
            </Action>
            <di spl ayCondi ti on>
                <condi ti onType>mi ssCal I</condi ti onType>
            </di spl ayCondi ti on>
        </SoftKey>

        <SoftKey>
            <Label>Cancel Fwd</Label>
            <Action>
                <Cancel Fwd/>
            </Action>
            <di spl ayCondi ti on>
                <condi ti onType>cal I Fwded</condi ti onType>
            </di spl ayCondi ti on>
        </SoftKey>

        <SoftKey>
            <Label>Fwd AI I</Label>
            <Action>
                <FwdAI I />
            </Action>
        </SoftKey>
    </SoftKeys>
</IdleScreen>
</Screen>

```

XML EXPLANATION

ROOT ELEMENT “SCREEN”

The XML document has root element called `Screen`; it contains exactly 1 sub-element called `IdleScreen`. In the future we can extend this syntax to allow customization of other screens (such as “RingingScreen” and/or “InCallScreen”) and eventually evolve to a “theme” concept.

```
<xs:element name="Screen">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="IdleScreen" type="IdleScreenType"
        minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

ELEMENT “IDLESCREENTYPE”

This element defines three components that make up the idle screen. These components are defined as elements which are described in 5.3-5.5.

```
<xs:element name="IdleScreen" minOccurs="1" maxOccurs="1">
  <xs:complexType>
    <xs:sequence>
      <!-- The ShowStatusLine element is now optional and default to false.
           Ignored by GXP2020 -->
      <xs:element name="ShowStatusLine" type="xs:boolean" minOccurs="0" maxOccurs="1"
        default="false"/>

      <xs:element name="DisplayBitmap" type="BitmapType" minOccurs="0"
        maxOccurs="unbounded" nullable="true" />

      <xs:element name="DisplayString" type="StringType" minOccurs="0"
        maxOccurs="unbounded" nullable="true" />

      <!-- The DisplaySoftKey element apply only to GXP-2020/2010 and is ignored by GXP-2000
           -->
      <xs:element name="DisplaySoftKey" type="SoftKeyType" minOccurs="0" maxOccurs="12"
        nullable="true"/>

      <!-- The UseDefaultSoftKeys element apply only to GXP-2020/2010 and is ignored by GXP-
           2000. If it is missing by default it is false, when it is true, any DisplaySoftKey elements
           would be ignored and the system default softkeys would apply -->
      <xs:element name="UseDefaultSoftKeys" type="xs:boolean" minOccurs="0" maxOccurs="1"
        default="false"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Note: By the above grammar, `ShowStatusLine` is now optional and default to false (previously must appear exactly once) and any number of `DisplayBitmap`, `DisplayString` and `DisplaySoftKey` instances.

DISPLAY RULES

When both `DisplayBitmap` and `DisplayString` elements are present, all bitmaps will be rendered before the strings are displayed. When multiple instances of the same type (bitmap/string) are present, they are displayed in the order they appear in the XML and later objects (bitmap/string) may overwrite/corrupt previous objects.

.

ELEMENT “SHOWSTATUSLINE”

This Boolean element decides if we will display the status bar on the top of the screen. The “Status Line” includes the registration status icon, volume icon, time/date on the right-top corner, and the horizontal separator line.

This element must appear exactly once in `Idl eScreenType` and has a default value of “true”.

When set to false, the origin (x-0, y-0) refers to the absolute top-left corner; when set to true, the origin refers to the reference-origin below status line (x-0,y-16). This means when `ShowStatusLine` is set to true, all y-offsets are shift down for 16 pixels so the status line will not be corrupted or over-written.

NOTE: Boolean variables have 2 possible values only: “true” and “false”

ELEMENT DISPLAYBITMAP

This element carries the information on how a bitmap is to be rendered on screen. It has three mandatory elements and one optional attribute:

Element Bitmap

This element contains the bitmap encoded by base64

```
<xsd:element name="Bi tmap" type="xsd:base64Bi nary" mi nOccurs="1" maxOccurs="1"/>
```

Note: We only accept Windows Bitmap (file header begins with 0x424D) that is monochrome (1-bit depth) and not exceeding 130x65 pixels (that’s our LCD resolution). Anything not bound to the above restriction is dropped and ignored. You may use Windows Paint to change an existing BMP file to 1-bit depth.

Elements X and Y

This element contains X and Y offsets from the origin that we will use to render the bitmap.

```
<xsd:element name="X" type="xsd:i nteger" mi nOccurs="1" maxOccurs="1" defaul t="0"/>
<xsd:element name="Y" type="xsd:i nteger" mi nOccurs="1" maxOccurs="1" defaul t="0"/>
```

Attribute a1reg

This OPTIONAL attribute specifies the conditions when the bitmap will be displayed.

```
<xsd:attribute name="a1reg" type="xsd:bool ean"/>
```

When this attribute is present and the value is “true” then the bitmap will be displayed ONLY when SIP Account 1 is in REGISTERED state.

When this attribute is present and the value is “false” then the bitmap will be displayed only when SIP Account 1 is NOT in REGISTERED state.

Note: When this attribute is absent then this bitmap is displayed regardless to the SIP Account 1 registration states.

NOTE: Boolean variables have 2 possible values only: “true” and “false”; any other value such as “Yes” or “No” will result in the bitmap displayed regardless of the SIP Account 1 registration status

ELEMENT DISPLAYSTRING

This element carries the information on how a string is to be rendered on screen. It has three mandatory elements and four optional attributes:

Element DisplayStr

This element contains the string to be displayed

```
<xsd:element name="Di spl ayStr" type="xsd:stri ng" mi nOccurs="1" maxOccurs="1"/>
```

The string can contain dynamic contents. As present, we support the following 18 system variables that will be substituted with dynamic contents at run-time.

1. \$W: This variable is replaced with the current day of week and has the following possible values: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
2. \$N: This variable is replaced with the configured Account 1 Display Name.
3. \$X: This variable is replaced with the configured Account 1 SIP User ID.
4. \$V: This variable is replaced with the configured Account 1 SIP Server.
5. \$I: This variable is replaced with the system IP address.
6. \$D: This variable is replaced with the current day of month with leading zero, possible values: 01, 02, ..., 31
7. \$d: This variable is replaced with the current day of month without leading zero, possible values: 1, 2, ..., 31
8. \$M: This variable is replaced with the current month in English, possible values: January, February, ..., December
9. \$o: This variable is replaced with the current month in number with leading zero, possible values: 01, 02, ..., 12
10. \$n: This variable is replaced with the current month in number without leading zero, possible values: 1, 2, ..., 12
11. \$Y: This variable is replaced with the current year in 4-digit number, for example: 2006, 2007 ...
12. \$y: This variable is replaced with the current year in 2-digit number, for example: 06, 07 ...
13. \$P: This variable is replaced with the current AM/PM status in upper case, possible values: AM, PM
14. \$p: This variable is replaced with the current AM/PM status in lower case, possible values: am, pm
15. \$H: This variable is replaced with the current hour of day in 24-hour representation with leading zero, possible values: 00, 02, ..., 23
16. \$h: This variable is replaced with the current hour of day in 12-hour representation with leading zero, possible values: 01, 02, ..., 12
17. \$m: This variable is replaced with the current minute of hour with leading zero, possible values: 01, 02, ..., 59
18. \$s: This variable is replaced with the current second of minute with leading zero, possible values: 01, 02, ..., 59

Note: If you want to display the "\$" sign, you will use "\$\$" escape sequence.

Elements X and Y

This element contains X and Y offsets from the origin that we will use to render the string.

```
<xsd:element name="X" type="xsd:integer" minOccurs="1" maxOccurs="1" default="0"/>
<xsd:element name="Y" type="xsd:integer" minOccurs="1" maxOccurs="1" default="0"/>
```

Attribute a1reg

This OPTIONAL attribute specifies the conditions when the string will be displayed.

```
<xsd:attribute name="a1reg" type="xsd:boolean"/>
```

When this attribute is present and the value is "true" then the string will be displayed ONLY when SIP Account 1 is in REGISTERED state.

When this attribute is present and the value is "false" then the string will be displayed only when SIP Account 1 is NOT in REGISTERED state.

Note: When this attribute is absent then this string is displayed regardless to the SIP Account 1 registration states.

NOTE: Boolean variables have 2 possible values only: “true” and “false”; any other value such as “Yes” or “No” will result in the string displayed regardless of the SIP Account 1 registration status.

Attribute font

This OPTIONAL attribute specifies the font we will use to render the string.

```
<xsd:attribute name="font" type="fontType"/>

<xsd:simpleType name="fontType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="f8"/>
    <xsd:enumeration value="f10"/>
    <xsd:enumeration value="f13h"/>
    <xsd:enumeration value="f13b"/>
    <xsd:enumeration value="f16"/>
    <xsd:enumeration value="f16b"/>
    <!-- f18c is a 18 point Comic font -->
    <xsd:enumeration value="f18c"/>
  </xsd:restriction>
</xsd:simpleType>
```

This application supports 1 system font and 7 additional fonts in various sizes as enumerated above. Any fonts not recognize will default to the system font. When this attribute is absent, default is system font.

Attribute halign

This OPTIONAL attribute specifies the horizontal alignment method used to display the string.

```
<xsd:attribute name="halign" type="HorizontalAlignmentType"/>
<xsd:simpleType name="HorizontalAlignmentType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Left"/>
    <xsd:enumeration value="Center"/>
    <xsd:enumeration value="Right"/>
  </xsd:restriction>
</xsd:simpleType>
```

We will default to Left when this attribute is absent.

Note: When using the Center alignment you will need to calculate the midpoint for the x-coordinate (4.5.2) for the width to be considered centered. For instance, element X must be set to 65 (130/2) to display a string that is aligned to the center of the LCD. Similarly, you will need to specify the right most point to render if you are using the Right align method.

Attribute valign

This OPTIONAL attribute specifies the vertical alignment method used to display the string.

```
<xsd:attribute name="valign" type="VerticalAlignmentType"/>

<xsd:simpleType name="VerticalAlignmentType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Top"/>
    <xsd:enumeration value="Center"/>
    <xsd:enumeration value="Bottom"/>
  </xsd:restriction>
</xsd:simpleType>
```

We will default to Top when this attribute is absent.

Note: When using the Center alignment you will need to calculate the midpoint for the y-coordinate (4.5.3) for the width to be considered centered. For instance, element Y must be set to 32 to display a string that is aligned to the center of the LCD. Similarly, you will need to specify the right most point to render if you are using the Bottom valign method (set to 64).

Application 2: XML Phonebook Details

XML PHONEBOOK SYNTAX

XSD FILE

```
<?xml version="1.0"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="AddressBook">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Contact" minOccurs="1" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="LastName" type="xsd:string" minOccurs="1"/>
              <xsd:element name="FirstName" minOccurs="0" type="xsd:string" nillable="true"/>
              <xsd:element name="Address" minOccurs="0" nillable="true">
                <xsd:complexType>
                  <xsd:sequence>
                    <xsd:element name="address1" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                    <xsd:element name="address2" type="xsd:string" minOccurs="0" maxOccurs="1"/>
                    <xsd:element name="city" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                    <xsd:element name="state" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                    <xsd:element name="zipcode" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                    <xsd:element name="country" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                  </xsd:sequence>
                </xsd:complexType>
              </xsd:element>
            <xsd:element name="Phone">
              <xsd:complexType>
                <xsd:sequence>
                  <xsd:element name="phonenumber" type="xsd:string" minOccurs="1" maxOccurs="1"/>
                  <xsd:element name="accountindex" type="xsd:integer" minOccurs="1" maxOccurs="1" default="1"/>
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
          <xsd:element name="Email" type="xsd:string" minOccurs="0" nillable="true"/>
          <xsd:element name="Department" type="xsd:string" minOccurs="0" nillable="true"/>
          <xsd:element name="Company" type="xsd:string" minOccurs="0" nillable="true"/>
          <xsd:element name="Icon" type="xsd:base64Binary" minOccurs="0" nillable="true"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
</xsd:schema>
```

EXAMPLE XML PHONEBOOK FILE

```
<?xml version="1.0"?>
<AddressBook>
  <Contact>
    <LastName>Doe</LastName>
    <FirstName>John</FirstName>
    <Phone>
      <phonenumber>8000</phonenumber>
      <accountindex>0</accountindex>
    </Phone>
  </Contact>
  <Contact>
    <LastName>Smith</LastName>
    <FirstName>Alan</FirstName>
    <Phone>
      <phonenumber>8001</phonenumber>
      <accountindex>0</accountindex>
    </Phone>
  </Contact>
</AddressBook>
```


Application 3: XML Call Center/Survey Details

XML CALL CENTER / SURVEY DETAILS

XML Application Syntax

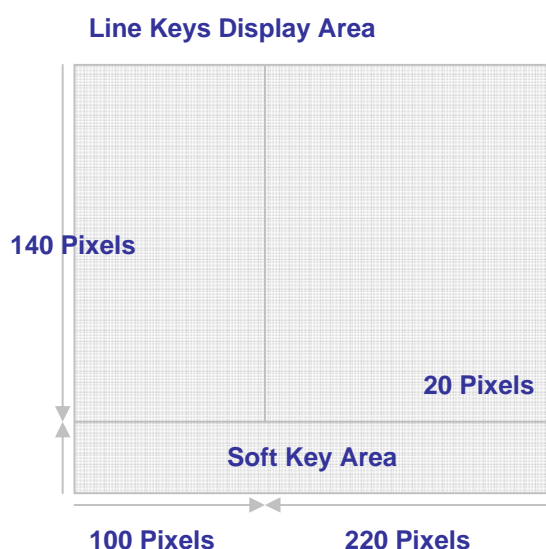
This section gives a brief overview of the screen layout and the XML syntax.

SPECIAL CHARACTERS

As followed by the standard XML recommendation, some characters need to be escaped. The following list the characters together with their escape sequence:

| Characters | Name | Escape Sequence |
|------------|---------------------|-----------------|
| & | Ampersand | & |
| " | Quote | " |
| ' | Apostrophe | &apos |
| < | Left Angle Bracket | < |
| > | Right Angle Bracket | > |

GRANDSTREAM XML OBJECT



GXP2020 XML Display



As illustrated above, XML content will be displayed in the 140 X 220 display area. Accordingly, the soft keys will be displayed in their respective area. A single XML object will represent the display area. This XML object takes precedence over the current display. It will also overwrite the soft keys functionality to give users control over the XML.

Grandstream GS_XML Object Descriptions

| Name | Location | Type | Values | Comments |
|--------------------|-----------|-----------|--------|--|
| GS_XML_Application | Root | Mandatory | - | Root element |
| Display | Root Body | Optional | - | Screen display |
| SoftKeys | Root Body | Optional | - | Programmable Softkey |
| Events | Root Body | Optional | - | Determines what action to be done when a local event is detected |

Display Object Description

| Name | Location | Type | Values | Comments |
|---------|--------------|----------------|--------|----------------------|
| Display | Root Body | Optional | - | Screen display |
| Screen | Display Body | Display Choice | - | Unselectable display |
| *Menu | Display Body | Display Choice | - | Selectable display |

* indicates future implementation.

Screen Object Descriptions

| Name | Location | Type | Values | Comments |
|----------------|------------------|----------------|---------|--|
| Screen | Display Body | Display Choice | - | Unselectable display |
| showLineLabels | Screen Attribute | Optional | Boolean | Enable or disable line labels display to extend xml application display area |
| DisplayString | Screen Body | Optional | - | Display a string on the screen |
| DisplayBitmap | Screen Body | Optional | - | Display a bitmap on the screen |

DisplayBitmap Object XML Description

| Name | Location | Type | Values | Comments |
|---------------|--------------------|-----------|---------|--|
| DisplayBitmap | Screen Body | Optional | - | Display a bitmap on the screen |
| X | DisplayBitmap Body | Mandatory | Integer | Horizontal starting position depending on valign |
| Y | DisplayBitmap Body | Mandatory | Integer | Vertical starting position depending on valign |
| Bitmap | DisplayBitmap Body | Mandatory | Strings | Content of the bitmap |

DisplayString Object XML Description

| Name | Location | Type | Values | Comments |
|---------------|-------------------------|----------|---------------------|-------------------------------|
| DisplayString | Screen Body | Optional | - | Descriptions of a line string |
| Font | DisplayString Attribute | Optional | Enum string | The font for a line |
| Halgin | DisplayString Attribute | Optional | Left, Center, Right | Horizontal Axis Alignment |

| | | | | |
|------------|-------------------------|-----------|---------------------|--|
| Valign | DisplayString Attribute | Optional | Top, Center, Bottom | Vertical Axis Alignment |
| Wrap | DisplayString Attribute | Optional | Boolean | Wrap the text to the next line |
| X | DisplayString Body | Mandatory | Integer | Horizontal starting position depending on valign |
| Y | DisplayString Body | Mandatory | Integer | Vertical starting position depending on valign |
| DisplayStr | DisplayString Body | Mandatory | String | A String to display |

Softkeys Object XML Description

| Name | Location | Type | Values | Comments |
|---------|--------------|-----------|-------------|----------------------|
| SoftKey | Display Body | Optional | - | Programmable Softkey |
| Label | Softkey body | Mandatory | String | Label for the index |
| Action | Softkey Body | Mandatory | Enum String | Local Action |

Action Object XML Description

| Name | Location | Type | Values | Comments |
|---------|--------------|-----------|--------|----------------------------------|
| Action | Softkey Body | Mandatory | - | Action to be taken |
| UseURL | Action body | Choice | - | URL to call to |
| QuitApp | Action Body | Choice | - | Quit the current XML application |
| Dial | Action Body | Choice | - | Dial a number |

The remote server may specify actions for the local phone. These actions must be pre-defined *locally* before they can be executed. Currently, the local action is to quit the current XML application.

Dial Object XML Description

| Name | Location | Type | Values | Comments |
|---------|-------------|-----------|---------|--------------------|
| Dial | Action Body | Choice | - | Dial a number |
| Account | Dial body | Mandatory | Integer | Account to be used |
| Number | Dial Body | Mandatory | Integer | Number to dial |

Events Object XML Description

| Name | Location | Type | Values | Comments |
|-------|-------------|----------|--------|---------------------------|
| Event | Events body | Optional | - | Describe a specific event |

Event Object XML Description

| Name | Location | Type | Values | Comments |
|--------|------------|-----------|-------------------|---|
| State | Event Body | Mandatory | Enumerated string | The possible state of the phone |
| Action | Event Body | Mandatory | - | Action to be taken if phone changes to that state |

An action is triggered only if the phone **transition INTO** such state.

Example of Survey Implementation

An initial URL is configurable using the web interface. This is the location of the server that the phone will attempt to interact with. It can be triggered by, lets say, overloading the phonebook button or the right arrow button or even by providing a menu in which the user can select with from the phone. In this example, we will use the initial URL to be: <http://www.XMLquestionnaire.com:123> where 123 represent the port.

Once the XML service is triggered, the phone will send an empty HTTP GET request to the above URL at the selected port. The server will respond with a 200 OK with the XML attached to the packet. The XML syntax may look like this:

```
<GS_XML_Application>
  <Display>
    <Screen>
      <DisplayString>
        <X>0</X>
        <Y>0</Y>
        <DisplayStr> Do you have a spouse?</DisplayStr>
      </DisplayString>
    </Screen>
  </Display>
  <SoftKeys>
    <SoftKey>
      <Label>Previous</Label>
      <Action>
        <UseURL>
          <URL>http://www.XMLquestionnaire.com/questionnaire.php?do=prev </URL>
        </UseURL>
      </Action>
    </SoftKey>
    <SoftKey>
      <Label>Yes</Label>
      <Action>
        <UseURL>
          <URL>http://www.XMLquestionnaire.com/questionnaire.php?ans=yes </URL>
        </UseURL>
      </Action>
    </SoftKey>
    <SoftKey>
      <Label>No</Label>
      <Action>
        <UseURL>
          <URL>http://www.XMLquestionnaire.com/questionnaire.php?ans=no </URL>
        </UseURL>
      </Action>
    </SoftKey>
    <SoftKey>
      <Label>Next</Label>
      <Action>
        <UseURL>
          <URL>http://www.XMLquestionnaire.com/questionnaire.php?do=next </URL>
        </UseURL>
      </Action>
    </SoftKey>
  </SoftKeys>
</GS_XML_Application>
```

After receiving the 200 OK, the display and softkey area of the screen is changed to show the XML content:

| | | | |
|-----------------------|-----|----|------|
| | | | |
| Do you have a spouse? | | | |
| Previous | Yes | No | Next |

Each softkey is bound by a URI, and pressing the soft key will call the corresponding URI. If the second softkey is pressed <http://www.XMLquestionnaire.com/questionnaire.php?ans=yes> is called. The server now knows the client response because the URI given to each soft key is unique. Once the answer is received, the server will send a 200 ok with another XML attached.

```
<GS_XML_Application>
  <Display>
    <Screen>
      <DisplayString valign="Center">
        <X>0</X>
        <Y>0</Y>
        <DisplayStr> Thank you for taking the </DisplayStr>
      </DisplayString>
      <DisplayString>
        <X>0</X>
        <Y>10</Y>
        <DisplayStr>Survey</DisplayStr>
      </DisplayString>
      <DisplayString valign="Right" valign="Bottom">
        <X>0</X>
        <Y>0</Y>
        <DisplayStr>Surveyor</DisplayStr>
      </DisplayString>
    </Screen>
  </Display>
  <SoftKeys>
    <SoftKey>
      <Label>Previous</Label>
      <Action>
        <UseURL>
          <URL>http://www.XMLquestionnaire.com/questionnaire.php?do=prev </URL>
        </UseURL>
      </Action>
    </SoftKey>
    <SoftKey>
      <Label>Quit</Label>
      <Action>
        <QuitApp/>
      </Action>
    </SoftKey>
  </SoftKeys>
</GS_XML_Application>
```

In this XML, note that the last word, "Survey", displayed at the center of the screen is in a new Line element. Otherwise, it would be displayed off the screen and look like this screen:

| | |
|---------------------------------|------|
| Thank You for taking the Survey | |
| Surveyor | |
| Previous | Quit |

EXAMPLE XML FILE

The following XML file syntax uses Dial action and Event elements and the Line Labels turned off. This syntax will display this introduction screen:

| |
|--|
| Hello. Please press Dial to start and hang up the phone to exit the application. |
| Dial |

XML SYNTAX

```

<GS_XML_Application>
  <Display>
    <Screen showLineLabels="false">
      <DisplayString>
        <X>0</X>
        <Y>0</Y>
        <DisplayString wrap="true"> Hello. Please press Dial to start
        dialing and hang up the phone to exit the application.
        </DisplayString>
      </DisplayString>
    </Screen>
  </Display>
</SoftKeys>
  <SoftKey>
    <Label>Dial</Label>
    <Action>
      <Dial>
        <Account>0</Account>
        <Number>3051</Number>
      </Dial>
    </Action>
  </SoftKey>
</SoftKeys>
<Events>
  <Event>
    <State>Onhook</State>
    <Action>
      <QuitApp/>
    </Action>
  </Event>
</Events>

```

```
        </Action>  
    </Event>  
</Events>  
</GS_XML_Application>
```

Pressing **Dial** dials 3051 with Account 1. After the survey is finished and the user hangs up, the survey is ended. The QuitApp action is triggered.

XML SURVEY CONFIGURATION

1. Before the XML survey application can be launched, the GXP2020 firmware must be upgraded to version 1.1.5.x.
2. After upgrading and rebooting, the XML server path on the advanced settings tab must be set to point to the server where the application is located (i.e. 12.34.56.78/test_gs.xml). Please make note that the account 1 page must be configured with a valid SIP account for the application to run. Reboot the phone again.
3. When the phone boots up, the first soft key will be "XML Service". Press this key to get started. It is also possible to enter the application server path into a web browser. This way you'll be able to see on your screen the exact XML that your phone is receiving also. If you press a soft key on your phone, you'll just need to navigate to the URL of the soft key, as can be seen in the XML code. For example, on 12.34.56.78/test_gs.xml, you'll see that the first soft key is set to make the phone browse to 12.34.56.78/politics_gs_start.xml. Press that soft key and enter that URL into your web browser, and you'll be seeing the XML code on your screen and the actual displayed page on your phone. This makes the implementation of the application relatively easy to understand.
4. Once the application is launched the first question of the survey will appear on the main body of the GXP LCD screen. The user can then answer the multiple choice questions with the corresponding soft key. Note: In some cases you will have to click on the "more" softkey if there are more than 4 multiple choice answers.
5. After completing one section of the survey, the user can jump to another category or automatically go to the next category by pressing the corresponding softkey.
6. After completing all the survey category's the application will prompt the user to exit.