Driver documentation for yealink usb-p1k phones

Status

The p1k is a relatively cheap usb 1.1 phone with:

- keyboard full support, yealink.ko / input event API
- LCD full support, yealink.ko / sysfs API
- LED full support, yealink.ko / sysfs API
- dialtone full support, yealink.ko / sysfs API
- ringtone full support, yealink.ko / sysfs API
- audio playback full support, snd_usb_audio.ko / alsa API
- audio record full support, snd_usb_audio.ko / alsa API

For vendor documentation see http://www.yealink.com

keyboard features

The current mapping in the kernel is provided by the map_p1k_to_key function:

```
Physical USB-P1K button layout       input events


           up                             up
     IN           OUT                left,   right
          down                               down

   pickup   C    hangup              enter, backspace, escape
     1      2      3                 1, 2, 3
     4      5      6                 4, 5, 6,
     7      8      9                 7, 8, 9,
     *      0      #                 *, 0, #,
```

The "up" and "down" keys, are symbolised by arrows on the button. The "pickup" and "hangup" keys are symbolised by a green and red phone on the button.

LCD features

The LCD is divided and organised as a 3 line display:

```
  |[]   [][]   [][]   [][]   in   |[][]
  |[] M [][] D [][] : [][]   out  |[][]
                            store

  NEW REP         SU MO TU WE TH FR SA

  [] [] [] [] [] [] [] [] [] [] [] []
  [] [] [] [] [] [] [] [] [] [] [] []


Line 1  Format (see below)    : 18.e8.M8.88...188
        Icon names            :   M  D  :  IN OUT STORE
Line 2  Format                : .........
        Icon name             : NEW REP SU MO TU WE TH FR SA
Line 3  Format                : 888888888888
```

Format description:

From a userspace perspective the world is separated into "digits" and "icons". A digit can have a character set, an icon can only be ON or OFF.

Format specifier:

```
'8' :  Generic 7 segment digit with individual addressable segments

Reduced capability 7 segment digit, when segments are hard wired together.
'1' : 2 segments digit only able to produce a 1.
'e' : Most significant day of the month digit,
      able to produce at least 1 2 3.
'M' : Most significant minute digit,
      able to produce at least 0 1 2 3 4 5.

Icons or pictograms:
'.' : For example like AM, PM, SU, a 'dot' .. or other single segment
      elements.
```

Driver usage

For userland the following interfaces are available using the sysfs interface:

```
/sys/.../
         line1        Read/Write, lcd line1
         line2        Read/Write, lcd line2
         line3        Read/Write, lcd line3

         get_icons    Read, returns a set of available icons.
         hide_icon    Write, hide the element by writing the icon name.
         show_icon    Write, display the element by writing the icon name.

         map_seg7     Read/Write, the 7 segments char set, common for all
                      yealink phones. (see map_to_7segment.h)

         ringtone     Write, upload binary representation of a ringtone,
                      see yealink.c. status EXPERIMENTAL due to potential
                      races between async. and sync usb calls.
```

lineX

Reading /sys/../lineX will return the format string with its current value.

Example:

```
cat ./line3
888888888888
Linux Rocks!
```

Writing to /sys/../lineX will set the corresponding LCD line.

- Excess characters are ignored.
- If less characters are written than allowed, the remaining digits are unchanged.
- The tab 't'and 'n' char does not overwrite the original content.
- Writing a space to an icon will always hide its content.

Example:

```
date +"%m.%e.%k:%M"  | sed 's/^0/ /' > ./line1
```

Will update the LCD with the current date & time.

get_icons

Reading will return all available icon names and its current settings:

```
cat ./get_icons
on M
on D
on :
   IN
   OUT
   STORE
   NEW
   REP
   SU
   MO
   TU
   WE
   TH
   FR
   SA
   LED
   DIALTONE
   RINGTONE
```

show/hide icons

Writing to these files will update the state of the icon. Only one icon at a time can be updated.

If an icon is also on a ./lineX the corresponding value is updated with the first letter of the icon.

Example - light up the store icon:

```
echo -n "STORE" > ./show_icon

cat ./line1
18.e8.M8.88...188
              S
```

Example - sound the ringtone for 10 seconds:

```
echo -n RINGTONE > /sys/..../show_icon
sleep 10
echo -n RINGTONE > /sys/..../hide_icon
```

Sound features

Sound is supported by the ALSA driver: snd_usb_audio

One 16-bit channel with sample and playback rates of 8000 Hz is the practical limit of the device.

Example - recording test:

```
arecord -v -d 10 -r 8000 -f S16_LE -t wav  foobar.wav
```

Example - playback test:

```
aplay foobar.wav
```

Troubleshooting

Q: Module yealink compiled and installed without any problem but phone is not initialized and does not react to any actions.

A: If you see something like: hiddev0: USB HID v1.00 Device [Yealink Network Technology Ltd. VOIP USB Phone in dmesg, it means that the hid driver has grabbed the device first. Try to load module yealink before any other usb hid driver. Please see the instructions provided by your distribution on module configuration.

Q: Phone is working now (displays version and accepts keypad input) but I can't find the sysfs files.

A: The sysfs files are located on the particular usb endpoint. On most distributions you can do: "find /sys/ -name get_icons" for a hint.

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