iSite BTS3001C-116V100R001

CAN

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About This Document

Purpose

This document describes the networking and protection of SDH, PDH, Ethernet, ATM, SAN and video services. In addition, network management information, orderwire and clock planning is described briefly.

This document provides guides to get the information about how to construct a network.

Intended Audience

This document is intended for:

- Policy planning engineers
- Installation and commissioning engineers
- NM configuration engineers
- Technical support engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
⚠ NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
📖 NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 01 (2018-03-16)

This issue is used for first office application (FOA).

Contents

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1 Description

1.1 CAN

1.1.1 General description

The CAN (Controller Area Network) bus, which is called controller LAN bus, is a kind of serial communication network that can support distributed control or real-time control effectively. It is widely used in industrial field control, intelligent buildings, medical devices, vehicles and sensors, and has been recognized as one of the most promising fieldbus because of its high performance, high reliability, unique design and appropriate price. The CAN bus specification has been defined as the international standard ISO11898 by the International Organization for Standardization, and has been supported by many semiconductor device manufacturers.

Based on the Hikey970 platform, this article mainly introduces how to provide CAN bus drivers to the Linux kernel by using character device driver

1.1.2 Features

- Supports CAN specification 2.0A/B, with a maximum transmission rate of 1Mbps;
- Supports standard data frames, extended data frames and remote frames with a data domain length of 0~8 bytes per frame.
- Supports for receiving filtering and receiving screening;
- The One-time mode ensures that messages are transmitted once;
- The start of frame (SOF) signal output function can be used to perform the time slot function in a defined system (such as time-triggered CAN-TTCAN), or to determine the early bus outage level out of the CAN bus diagnostics;

1.2 Driver Configuration

1.2.1 Bus Driver

The code path is as follows:

drivers/net/can/spi

1.2.2 Kernel Configuration

arch/arm64/configs/hikey970_defconfig

```
CONFIG_CAN=y

CONFIG_CAN_DEV=y

CONFIG_CAN_MCP251X=y

CONFIG_CAN_LEDS=y

CONFIG_CAN_DEBUG_DEVICES=y
```

1.2.3 DTS Configuration

Hikey970 CAN controller is mcp2515 which uses SPI protocol to interact with SOC, and hangs on SPI0 interface physically.

```
spi0: spi@ffd70000 {
            compatible = "arm,pl022", "arm,primecell";
            reg = <0x0 0xffd70000 0x0 0x1000>;
            #address-cells = <1>;
            #size-cells = <0>;
            interrupts = <GIC_SPI 113 IRQ_TYPE_LEVEL_HIGH>;
            clocks = <&iomcu KIRIN970_CLK_GATE_SPI0>;
            clock-names = "apb_pclk";
            pinctrl-names = "default";
            pinctrl-0 = <&spi0_pmx_func &spi0_cfg_func
&spi0_clk_cfg_func>;
            num-cs = <1>;
            cs-gpios = <&gpio28 6 0>;
            status = "ok";

            can0: can@0 {
                compatible = "microchip,mcp2515";
                reg = <0>;
                clocks = <&can_clk>;
                interrupt-parent = <&gpio18>;
                interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
                spi-max-frequency = <10000000>;
                can-rst = <&gpio6 2 0>;
                status = "ok";
            };
```

```
        };

CAN led configuration:

        can_active_led {

            label = "can_active";

            /* GPIO_012_USER_LED5*/

            gpios = <&gpio1 4 0>;

            linux,default-trigger = "can0-rxtx";

            default-state = "off";

        };
```

1.3 Interface Usage

CAN interface debugging tool:

https://github.com/linux-can/can-utils

The use of the tool is described in:

https://github.com/linux-can/can-utils/blob/master/README.md

1.3.1 Configuration can0

```
ip link set can0 type can tq 125 prop-seg 6   phase-seg1 7 phase-seg2 2 sjw 1
```

1.3.2 View

```
ip -details link show can0

  can0: <NOARP,UP,LOWER_UP,ECHO> mtu 16 qdisc pfifo_fast state UNKNOWN qlen 10

     link/can

     can state ERROR-ACTIVE (berr-counter tx 0 rx 0) restart-ms 0

     bitrate 500000 sample-point 0.875

     tq 125 prop-seg 6 phase-seg1 7 phase-seg2 2 sjw 1

     sja1000: tseg1 1..16 tseg2 1..8 sjw 1..4 brp 1..64 brp-inc 1
```

```
clock 16000000
```

1.3.3 Receiving Test

```
# ./candump can0
interface = can0, family = 29, type = 3, proto = 1
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
<0x00000002> [8] 70 01 02 03 04 05 06 07
```

1.3.4 Transmitting Test

```
./cansend can0 -e 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88
interface = can0, family = 29, type = 3, proto = 1
```

The received frame can be seen from the test software.

1.3.5 Restart

```
ifconfig can0 down
ip link set can0 up type can
```

1.3.6 Common Baud Rate

250kbps：

```
ip link set can0 type can tq 125 prop-seg 6   phase-seg1 7 phase-seg2 2 sjw 1
```

125kbps：

```
ip link set can0 type can tq 250 prop-seg 6   phase-seg1 7 phase-seg2 2 sjw 1
```

500kbps：

```
ip link set can0 type can tq 75 prop-seg 6   phase-seg1 7 phase-seg2 2 sjw 1
```

1000kbps：

```
ip link set can0 up type can bitrate 2000000
```

1.3.7 Common Usages

```
ip -details link show can0

ifconfig can0 down ;ip link set can0 up type can

./candump can0

./cansend   can0 -e 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88
```