SH4 Linux for Set-Top-Box

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What do ST do?

The top 10 semiconductor manufacturer nobody has heard of.

Products: everything from diodes to microprocessors.

Digital Video Division:

- Supplies the majority of MPEG2 decoder and microprocessors for digital set-top-box's.
- Provides reference hardware and software for various digital video products (e.g. satellite decoders and DVD players).

Micro Development Tools Division:

- Produces software tools for developers (compilers, debuggers, operating systems etc.).

Hitachi and ST

Hitachi and ST have formed a partnership to jointly develop the next generation of Super-H processors (Dec. 1997)

Current development has two strands:

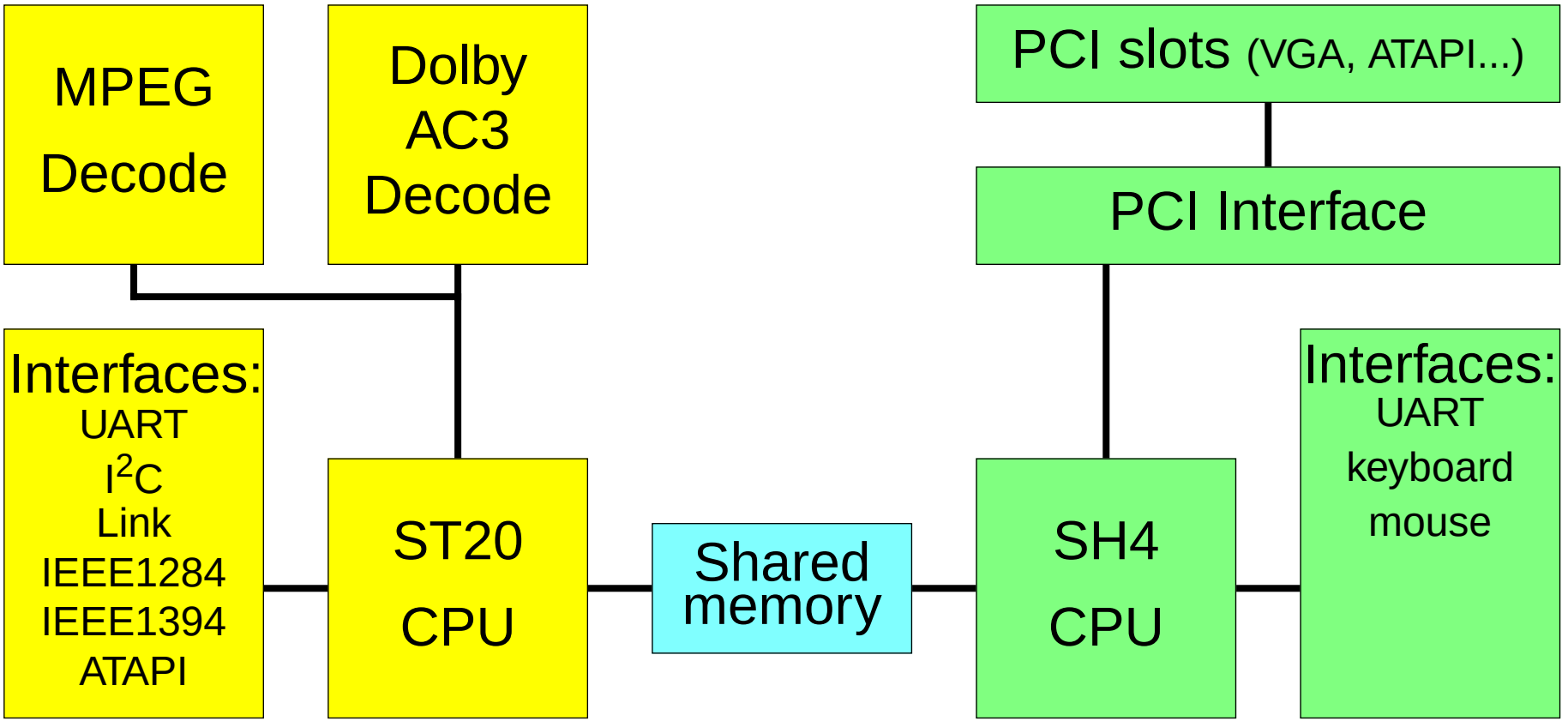
- ST licensed SH4 (ST parts will be called ST40)
- First product will be ST40STB1 (SH4 + PCI interface)

and:

- Joint development of next generation parts
- Hitachi parts will be called SH5, ST parts ST50
- 64 bit SHMedia instruction set (new)
- 32 bit SHCompact instruction set (compatible with SH4 user level code)

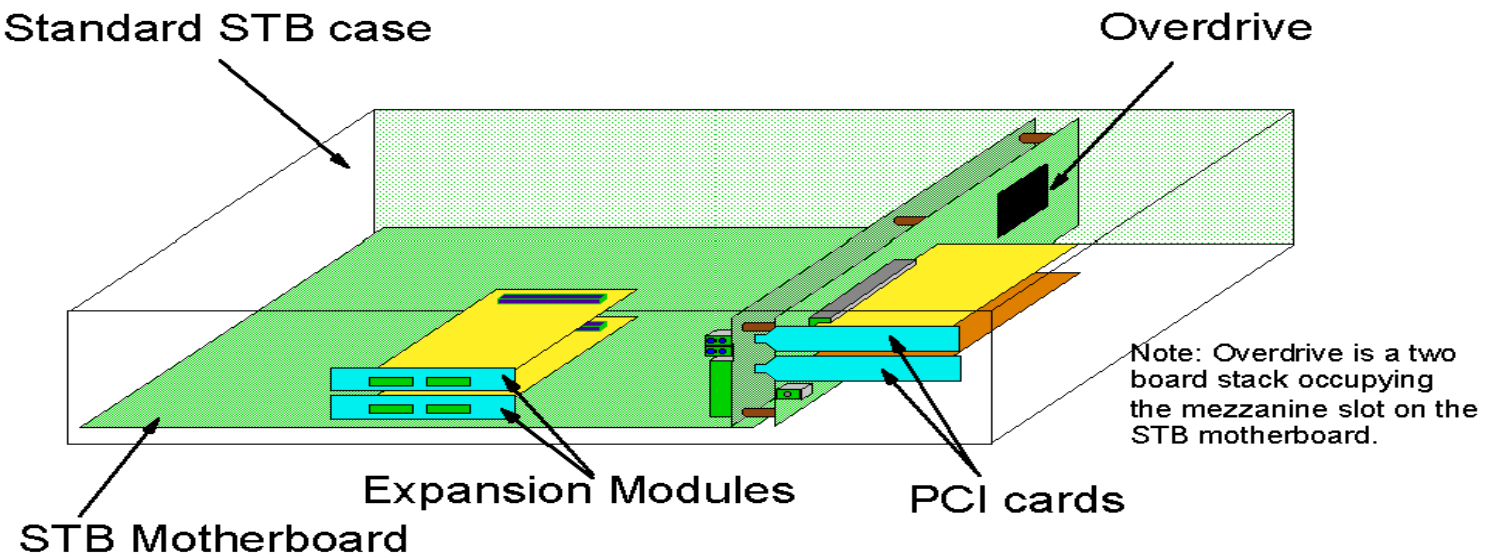
Orion (1)

Next generation Set-Top-Box hardware



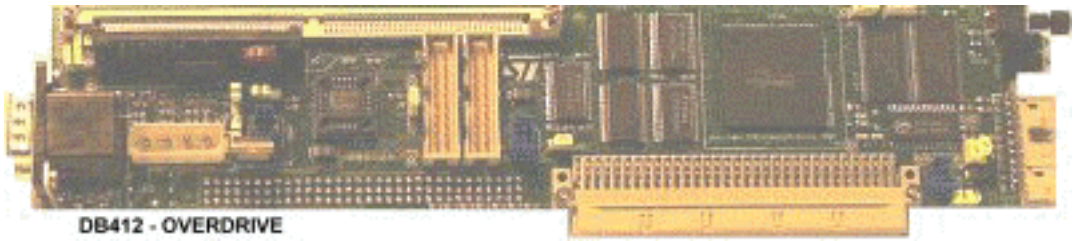
Orion (2)

Physical construction:

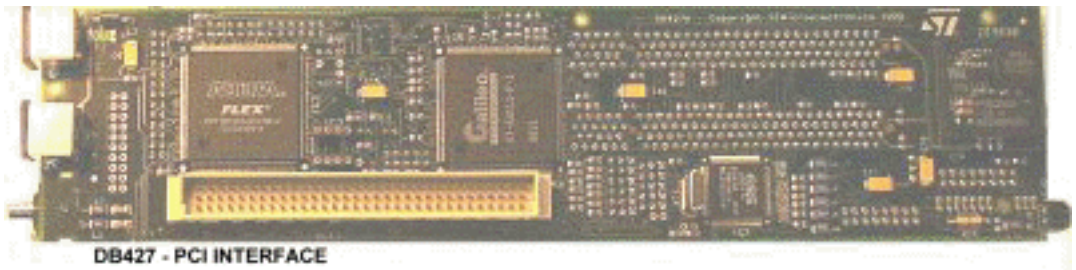


Orion (3)

Overdrive (SH4, SDRAM, Flash, DPRAM):



PCI Interface (PCI bridge, SDRAM, PCI Slots, SoundBlaster):



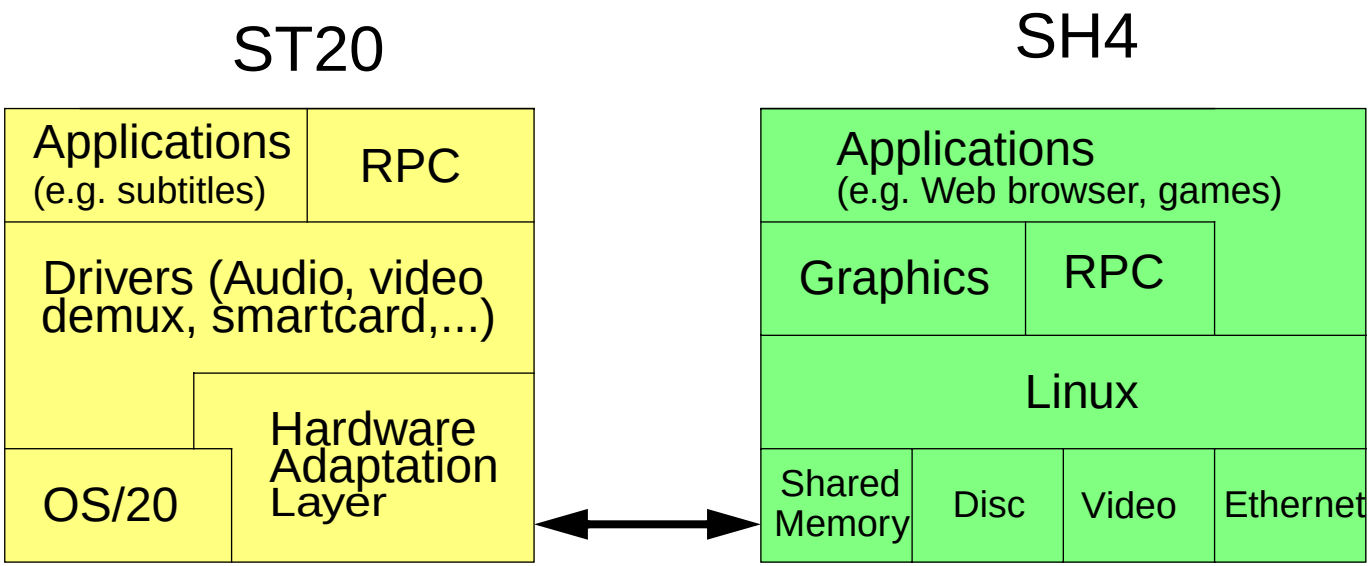
Why use Linux?

Why is Linux is of interest to set-top-box customers:

- Free (no up front or royalty payment)
- Increasing complexity of software means developers want increased functionality from the OS
- Standard API and tools
- Good networking facilities
- Availability of drivers for lots of devices
- Large number of applications
- Source code available
- Easy to customise

Orion and Linux

Software structure:



Linux Status

Currently:

- Independently developed port
- Kernel: Based on 2.2.9, upgraded to 2.2.13
- Running on Orion hardware
- No device drivers other than SCI(F)
- Applications running:
  - sash, bash, busybox, pppd, mount, telnetd
- Incompatibilities with other versions:
  - Different system calling convention
  - Different kernel interface

ToDo

Ongoing:

- ❏ Starting PCI support
- ❏ Investigating mainstream developments with a view to merging

Next:

- ❏ Device driver development (disk and Ethernet)
- ❏ Set up SH4/ST20 RPC mechanism
- ❏ X bring up
- ❏ Video display

Reflections on Kernel Porting

- Linux is easy to port!
  - Well structured
  - Portable (~3000 loc C, ~5000 loc header)
  - Consistent style
- Use gcc
- First get the serial port working (printk)
- Next some fundamental functions - test outside kernel
- Copy implementation where possible

URLs

Linux port home page:

`http://www.superh.uk.linux.org`

ST:

`http://www.st.com`

Super-H (SH5):

`http://www.superh.com`