



# Tornado/K5

## Broadband multimedia services to the TV

### Broadband service terminal

A general service terminal enabling always on entertainment and multimedia services over broadband networks.

### Fully software-defined

The functionality is software-defined which makes the Tornado/K5 flexible and adaptable to future needs.

### Easy development and deployment of new services

Standards-based open interface enables operators to create new services as easily as creating web pages.

### Key broadband services

- ▶ Video-on-Demand (over IP)
- ▶ Multicast TV (over IP)
- ▶ Interactive TV
- ▶ Electronic Program Guide (EPG)
- ▶ Internet surfing and e-mail on TV
- ▶ Streaming audio (MP3)
- ▶ Secure e-commerce
- ▶ Home banking
- ▶ ...

### Diagnostics

SNMP may be used for service terminal diagnostics.

### On Screen Display (OSD)

Messages made using standard web tools for HTML.

### Picture-in-Graphics

Pages made using standard web tools for HTML.

### Fast Ethernet controller on board

Supports both 10 and 100 Mbit/s.

### USB ports

Two USB ports for connection of peripherals.

### Infrared remote control and optional infrared keyboard

Designed for ergonomic, straightforward and easy interaction with the TV.

### Easy-to-use graphical interface

Menus and zap-table are reached with a single keystroke on the infrared remote control or keyboard. Internet web pages are enhanced to be better suited for the TV-screen.

### Extensive security solution

Conditional access and content protection using smartcard technology and PKI. Copy protection with Macrovision.

### Management System

#### Single point of management

All Tornado/K5 service terminals are supported and controlled by the same service and terminal management system, Netlook/IP, with a capacity of handling 100 000 service terminals.

#### Minimal network load

Kreatel patented Bootcast Service, used for service terminal software distribution, grants for good network performance, system scalability, reliability and quality of service.

#### Remote software upgrades

The Tornado/K5 software is easily updated and new services can be created and rolled out from Netlook/IP as they are developed.

#### Thin client technology

Service terminal data and parameters are stored in the management system, Netlook/IP, which makes the Tornado/K5 terminals highly cost efficient, flexible and protected from cracker violations.



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## Technical specification

### Hardware

- Microprocessor:  
National SC1200 32 bit, 266 MHz, x86-compatible processor with integrated TV video processor
- Main memory: 64 MB SDRAM (Optional 128 MB)
- Flash memory: 256kB (Optional 16 MB)
- MPEG-2 decoder: Sigma Designs EM8400

### Operating system

- Linux OS

### WWW browser

- Mozilla browser
- HTTP 1.1 [RFC2068, RFC2616] with extended MIME support for MPEG-1, MPEG-2, RTSP, MP3 and Shoutcast
- HTTPS [RFC2818 HTTP over TLS]
- HTML 4.0 [RFC2616] (GIF, JPEG, PNG, animated GIF)
- CSS1/CSS2 [RFC2318]
- DOM 1 / DOM 2
- JavaScript 1.5
- XML 1.0 with CSS
- Bookmarks
- Cookies

### External interfaces and connectors

#### Front panel

- Smartcard reader [ISO 7816-1/2/3/4]
- IR-receiver for remote control and optional infrared keyboard
- LED on the front for status indication

#### Rear panel

- 2 x SCART, NTSC-M, PAL-M/B/D/G/H/I, RGB, S-video, Composite video
- 1 x Ethernet, 10/100 Base-T, RJ45 (Option: 2 x Ethernet)
- 2 x RCA for analog stereo audio output
- 1 x RCA for digital audio output S/PDIF
- 2 x USB for peripherals

### Streaming audio

- MPEG-1 Audio Layer-3 (MP3)
- MPEG-1 Layer 1,2,3 models 32,44,48 kHz, mono, dual mono and stereo

### Streaming video

- MPEG-1 [ISO/IEC 11172-1, ISO/IEC 11172-2] (system stream - video streams, audio streams layer 1, 2 and 3), up to 8 Mbit/s, SIF 352x288
- MPEG-2 [ISO/IEC 13818-1, ISO/IEC 13818-2, ISO/IEC 13818-3] (system stream, program stream, transport stream – PAT, PMT, video and audio streams), constant and variable bit rate (CBR and VBR), up to 8 Mbit/s, MP@ML, Full D-1 720x576

### Video-on-Demand

- Support for Interactive Video-on-Demand (IVOD)
- Protocol RTSP
- Verified compliance with BitBand, Oracle Video Server, Kasenna and nCube

### Graphics

- 16 bits/pixel RGB for computer graphics
- 24 bits/pixel RGB for video
- 720x576 pixels resolution (full PAL) for computer graphics (PAL)
- 640x480 resolution for computer graphics (NTSC)
- On Screen Display (OSD)
- Picture-in-Graphics

### Security

- Macrovision copy protection ver. 7.01 (Optional)
- PKI (box login, encryption/decryption)
- SSL (version 3.0, 64 and 128 bits)

### Electrical values

- Power supply: External, 5 V
- Power consumption: max 15 W

### Physical

- Dimensions: 288 x 210 x 40 mm
- Unit weight: 1.3 kg
- Noise: Silent, no moving parts