APPLICATION NOTE 1003

TINI: Frequently Asked Questions

Answers to commonly asked questions about the TINI platform. Includes information for getting started, software setup and reference designs.

What is the TINI® Runtime Environment?

As IP networks have become more pervasive, it is now a necessary to network enable embedded systems. However, network protocols tend to be complicated to code and require a lengthy test cycle. The TINI runtime environment provides the entire software infrastructure needed to write network-aware applications for Maxim/Dallas Semiconductor IP-ready microcontrollers. The runtime environment provides a full TCP IPv4/v6 protocol stack verified for compliance to Internet standards. The network stack is driven by a multitasking operating system (TINI-OS). Using the runtime environment and its built-in APIs, developers can quickly write embedded applications that are network aware.

What microcontrollers can host the TINI runtime environment?

The TINI runtime environment is designed to execute on microcontrollers produced by Maxim/Dallas Semiconductor. The first microcontroller specifically developed for the runtime environment is the DS80C400 Network Microcontroller. The DS80C390, the predecessor to the DS80C400 Network Microcontroller, also can host the TINI runtime environment.

What are the features of the DS80C400?

- Four-clock-cycle 8051 core
- 16 Mb contiguous addressing
- 10/100 Base-T Ethernet MAC
- Operation up to 75MHz
- Low-power modes
- Three serial ports
- 24 general-purpose I/O pins
- 1-Wire® Master
- 64k ROM
  - Full TCP/IP v4/v6 network stack
  - Memory manager
  - Multitasking operating system
  - Automatic network boot

Which of the TCP/IP suite of protocols are supported?

Currently supported network protocols include:

- PPP
- IP v4/v6
- TCP

- UDP
- IGMP
- ICMP
- DAD
- SMTP
- DHCP
- FTP
- HTTP
- TELNET

What network interfaces are supported?

Both local and wide area networks can be accessed using the TINI stack. Direct support for Ethernet allows designs that connect to a LAN. PPP enables IP over serial, which supports networking over wireless connections or through phone lines using analog modems.

What is IPv6 and why is it supported in the network stack?

While most of the world is currently using IPv4, many new products will be required to support the next generation of IP protocols — IPv6. The TINI runtime environment is the first 8-bit embedded software with IPv6 support. Currently, IPv6 is most important in Asian markets, especially Japan. This is due to the lack of globally unique IP addresses allotted by IANA[1] within Asian countries. Cisco, Sun, Microsoft and other companies are all currently supporting and/or promoting IPv6. Over the next few years to overcome a shortage of IPv4 network addresses, support of IPv6 will become a necessity.

What I/O protocols are supported?

I/O interfaces provided with the runtime environment include[2]:

- Serial (RS232/485)
- *SPI
- Parallel
- I^2C
- 1-Wire
- CAN

Can additional I/O protocols be supported?

If a different I/O protocol is required, supporting APIs can be written in Java™, C or 8051 assembly language. Assembly language routines are accessible from Java and allow for hard real-time response to external events or high-speed I/O.

Can the microcontroller boot from the network?

Yes. A major feature contributing to always on-reliability is support for automatic network boot.

What are the advantages of automatic network boot?

Automatic network boot allows increased reliability of an embedded design. An application can be downloaded from the network to local memory and then executed by the microcontroller. This removes the need to have nonvolatile local storage. Another significant benefit to network boot is the ability to

update an application remotely.

If the network is down, will the microcontroller still execute?

Yes. In the event of network failure, the microcontroller can execute the most recently downloaded application.

What software language does the TINI runtime environment support?

Applications are written using Java and/or assembly language. C language applications can be written using the Keil or IAR development tools. More information can be found at ftp://ftp.dalsemi.com/pub/tini/ds80c400/c_libraries/

What is the current version of the runtime environment?

	1.0x	1.1x
I/O Interfaces		
RS232 Serial	Up to 4	Up to 4
1-Wire	2	2
I²C	1	1
RS485		1
SPI		1
CAN	2	1
Networking		
Full TCP/IP Stack	✓	✓
PPP	✓	✓
IPv4	✓	✓
IPv6		✓
DAD		✓
ND		✓
UDP	✓	✓
IGMP	✓	✓
ICMP	✓	✓
SMTP	✓	✓
DHCP	✓	✓
FTP	✓	✓
TELNET	✓	✓
HTTP	✓	✓
Java Features		
Processes	8	8
Threads	16	32
Serialization		✓
Dynamic Class Loading		✓
Reflection		✓
Primitive Types	All	All
Native Methods	Assembly	Assembly
IEEE 754 Floating Point	✓	✓

Reflection		✓
Primitive Types	All	All
Native Methods	Assembly	Assembly
IEEE 754 Floating Point	✓	✓
API Packages		
Java API Version	JDK[3] 1.1.8	JDK 1.1.8/1.2/1.4[4]
java.lang	✓	✓
java.io	✓	✓
java.util	✓	✓
java.net	✓	✓
Javax.comm	✓	✓

How do I begin development?

- Please see App Note 612 for details on getting started with the TINIm400 verification module.

Are the schematics for the TINI evaluation kit available?

Yes. The schematics for the verification module are available on the web at ftp://ftp.dalsemi.com/pub/tini/reference_designs.

What additional on-line resources are available?

The TINI discussion list is the best forum for technical questions. Go to http://discuss.dalsemi.com to sign up.

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[1]IANA - Internet Assigned Numbers Authority
[2]A Bit-bang SPI library is available for the DS80C400
[3]The JDK (Java Developers Kit) is provided free of charge by Sun Microsystems. The APIs defined in the JDK define the capabilities of the Java platform. The bulk of the runtime environment's Java API follows the standards of JDK1.1.8.
[4]Serialization, dynamic class loading and reflection follow the definitions provided in JDK1.2. IPv6 support was first introduced in JDK1.4.

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More Information

DS80C390: QuickView -- Full (PDF) Data Sheet -- Free Samples

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