

MBCI: Mini Bus Controller Interface Specification

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1 Overview

The Mini Bus Controller Interface (MBCI) is a standardized memory-mapped I/O bus specification designed for use in embedded systems and operating system kernels. It provides an extensible framework for managing hardware devices via a shared bus using memory-mapped registers. It is designed to remain abstract and platform-agnostic, leaving platform-specific interrupt and address logic to the HAL.

2 Signal Lines

The MBCI bus interface includes the following signal lines:

- **VCC** (IN) – Power supply (OUT for MCU)
- **CLK** (IN) – Clock line (OUT for MCU)
- **ACK** (BI) – Acknowledge line containing packet frame
- **D0-**, **D1-** (IN) – Host interface packet input
- **D0+**, **D1+** (OUT) – Host interface packet output
- **GND** (IN) – Ground line (OUT for MCU)

3 Host Structure

IMBCIHost Structure

```
volatile struct IMBCIHost {
    UInt32 Magic;
    UInt32 HostId;
    UInt16 VendorId;
    UInt16 DeviceId;
    UInt8 MemoryType;
    UInt16 HostType;
    UInt16 HostFlags;
    UInt8 Error;
    UInt32 MMIOTest;
    UInt16 State;
    UInt8 Status;
    UInt8 InterruptEnable;
    UInt64 BaseAddressRegister;
    UInt64 BaseAddressRegisterSize;
    UInt32 CommandIssue;
    UInt8 Esb[64]; // Extended Signature Block
    UInt8 Zero[8];
};
```

4 Enumerations

Device Speeds

- `kMBCISpeedDeviceInvalid`
- `kMBCILowSpeedDevice`
- `kMBCIHighSpeedDevice`

Host Flags

- `kMBCIHostFlagsSupportsNothing`
- `kMBCIHostFlagsSupportsAPM`
- `kMBCIHostFlagsSupportsDaisyChain`
- `kMBCIHostFlagsSupportsHWInterrupts`
- `kMBCIHostFlagsSupportsDMA`
- `kMBCIHostFlagsExtended`

Host Types

- `kMBCIHostKindHardDisk`
- `kMBCIHostKindOpticalDisk`
- `kMBCIHostKindKeyboardLow`
- `kMBCIHostKindMouseLow`
- `kMBCIHostKindMouseHigh`
- `kMBCIHostKindKeyboardHigh`
- `kMBCIHostKindNetworkInterface`
- `kMBCIHostKindDaisyChain`
- `kMBCIHostKindStartExtended`

Host State

- `kMBCIHostStateInvalid`
- `kMBCIHostStateReset`
- `kMBCIHostStateSuccess`
- `kMBCIHostStateReady`
- `kMBCIHostStateDmaStart`
- `kMBCIHostStateDmaEnd`
- `kMBCIHostStateFail`
- `kMBCIHostStateCount`

5 Functions

MMIO Test

Tests if MMIO is accessible by writing and checking a challenge value. Times out if the bus does not respond.

```
inline BOOL busi_test_mmio(struct IMBCIHost* host, const UInt32 test);
```

Auth Key Reader

Reads the 24-bit auth key encoded in the last three bytes of the Extended Signature Block after verifying MMIO test success:

```
inline MBCIAuthKeyType mbc_read_auth_key(struct IMBCIHost* host);
```