ANALOG DEVICES

Handheld Devices and SMBus-One™

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Agenda

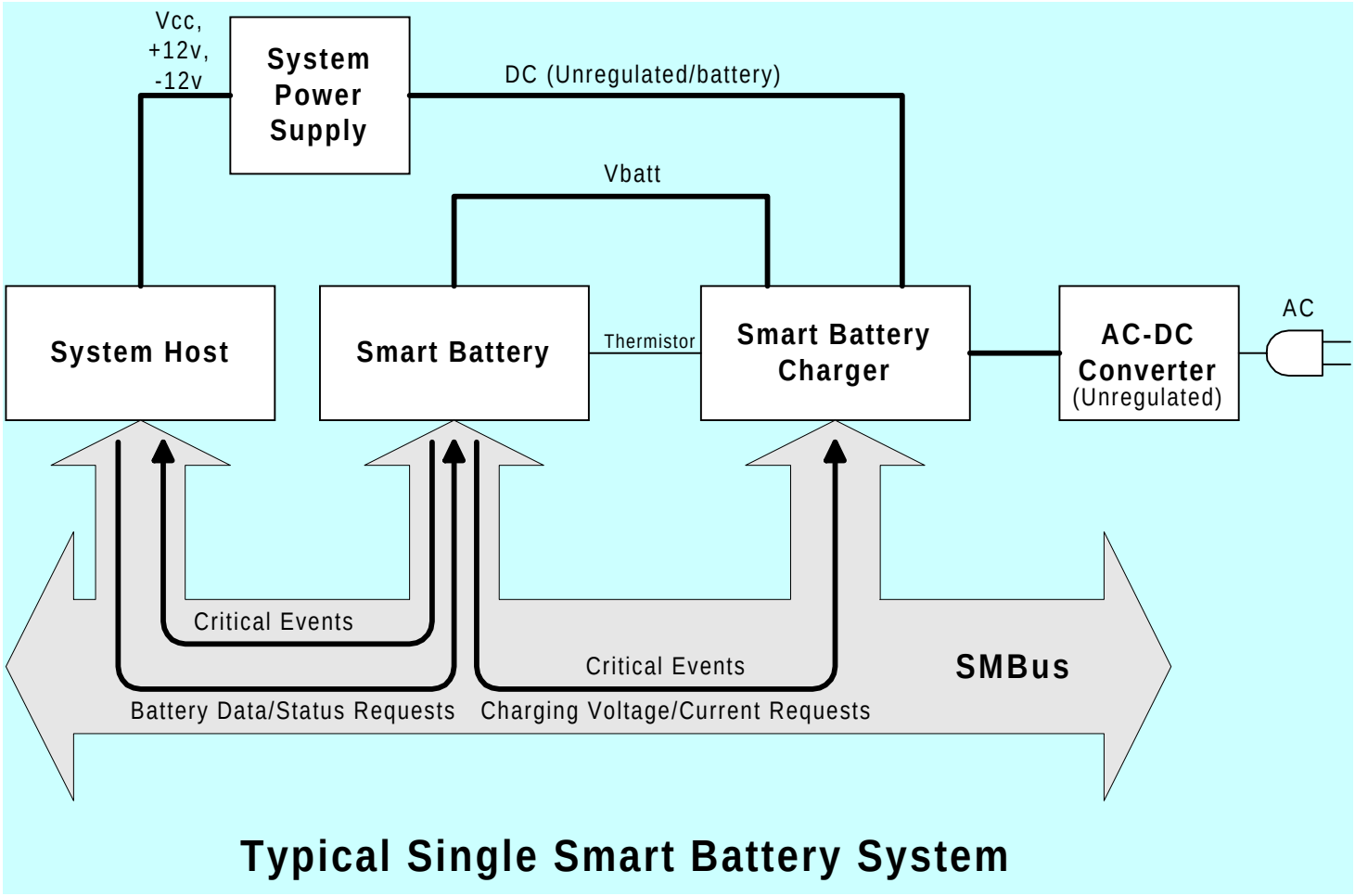
- Charter
- Market Purpose
- HH Data Set Goal
- System Models
- Physical Layer for HH Data Applications
- Summary
- Call to Action

Charter

- The SBS chartered a new Special Working Group to define a Handheld Data Set and Physical Layer
  - Work on communications
  - Be simpler than the notebook SMBus
  - Good for driving costs down.

Market Purpose

Notebook SBS System



Typical Single Smart Battery System

Parts of an Electronic Battery

- Batteries carrying electronics contain:
  - Fuel gauging
  - Host-battery communications
  - Fault protection (electronic and passive)
  - Abuse-tolerant design

Parts of a Smart Battery

- Options found only in some batteries:
  - Charge control
    - Smart Battery controlling external SB Charger
    - In-pack charge control
  - Historical usage pattern recording
  - Identification

Handheld Devices--today

Notebooks

- Smart Battery--here
- Multiple batteries are in Notebooks
- Standardization is driving cost down
- SMBus is accepted

Mobile Handsets

- Smart Battery is coming
- Multiple batteries are in one charger base
- Cost is an overriding concern
- No agreed physical layer

Goal for a Handheld Data Set

SBDS in PC's

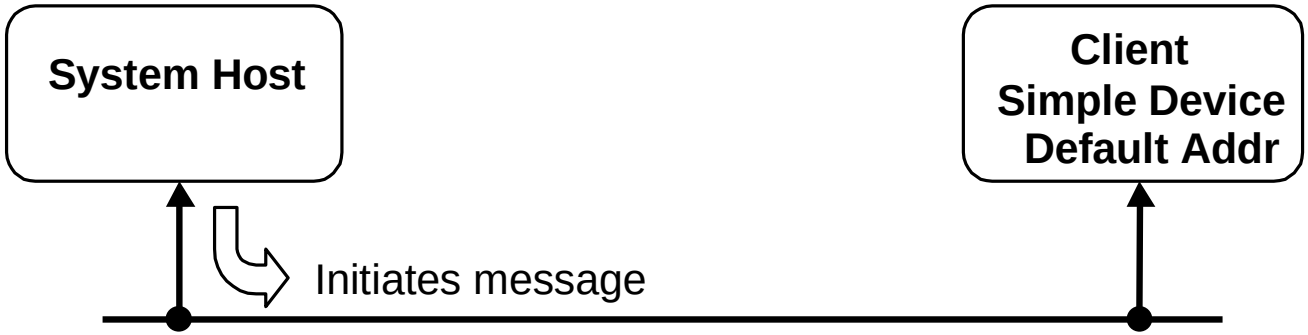
- SMBus only
- 16-bit data
- Ack/Nak in i2c.bus
- Master/Slave
- 33 commands

HDS

- Open-IP bus
- 8 to 12-bit data
- Robust error handling
- Slave only or M/S
- Few commands

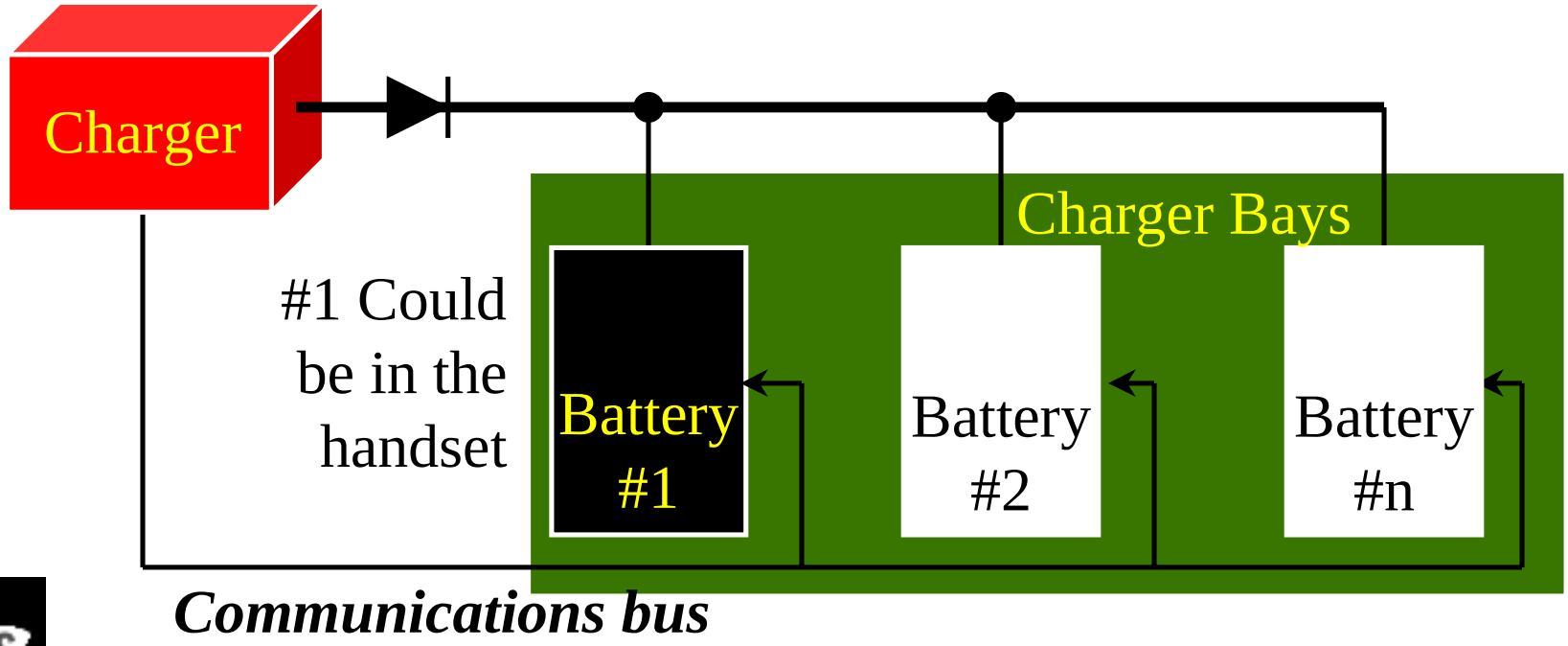
System Models

Simplest System Model

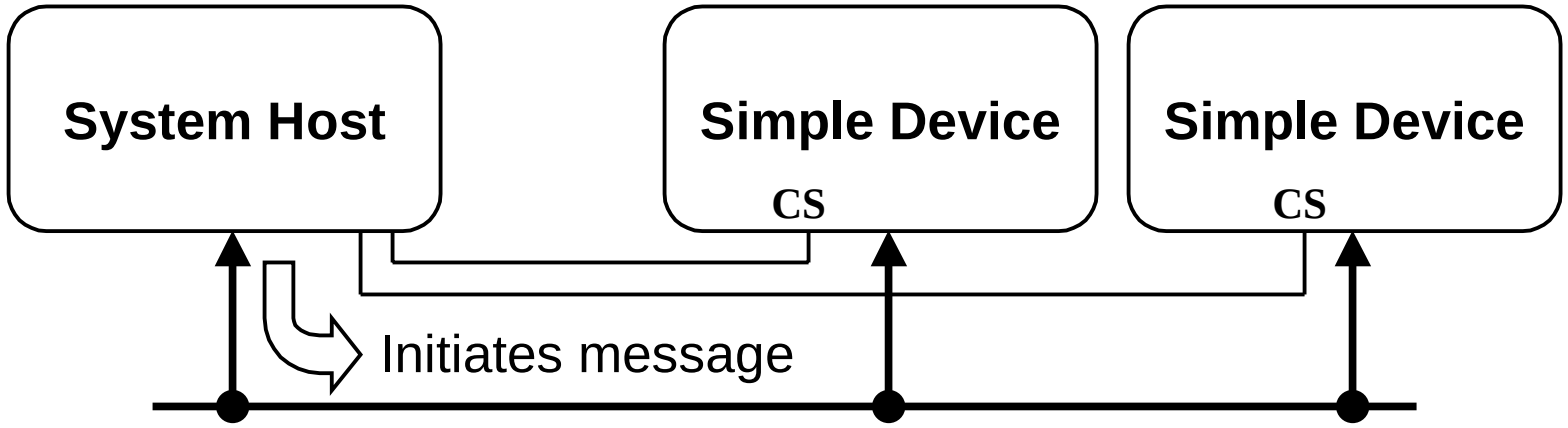


Common Handset System

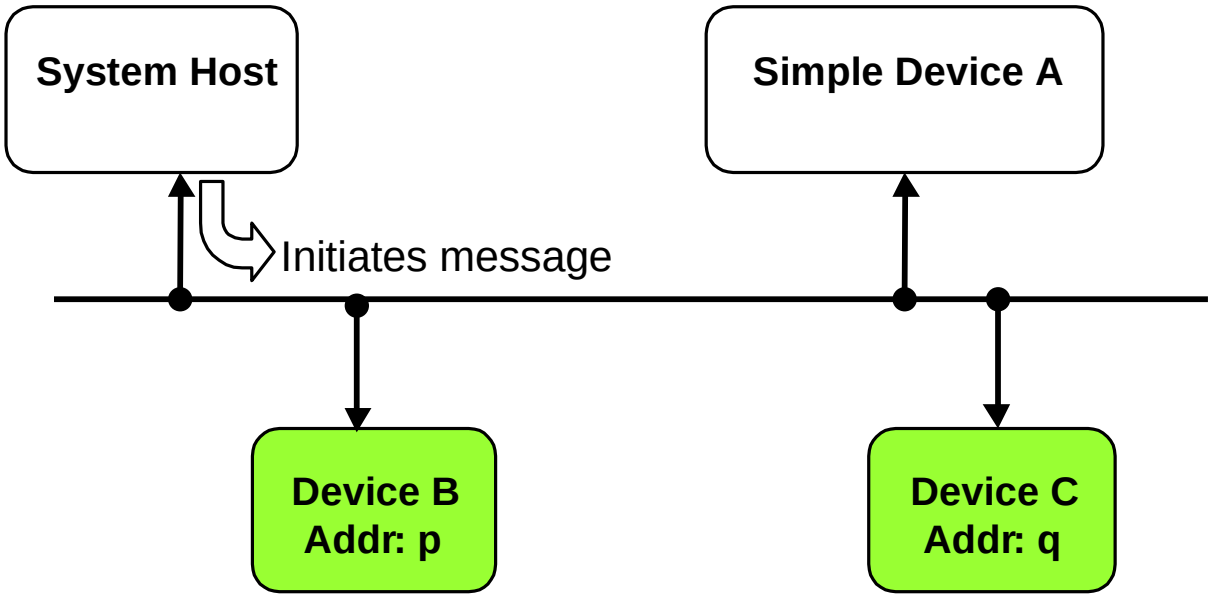
- When each battery has the same address, some selection method is needed!



Simplest Model with Selector

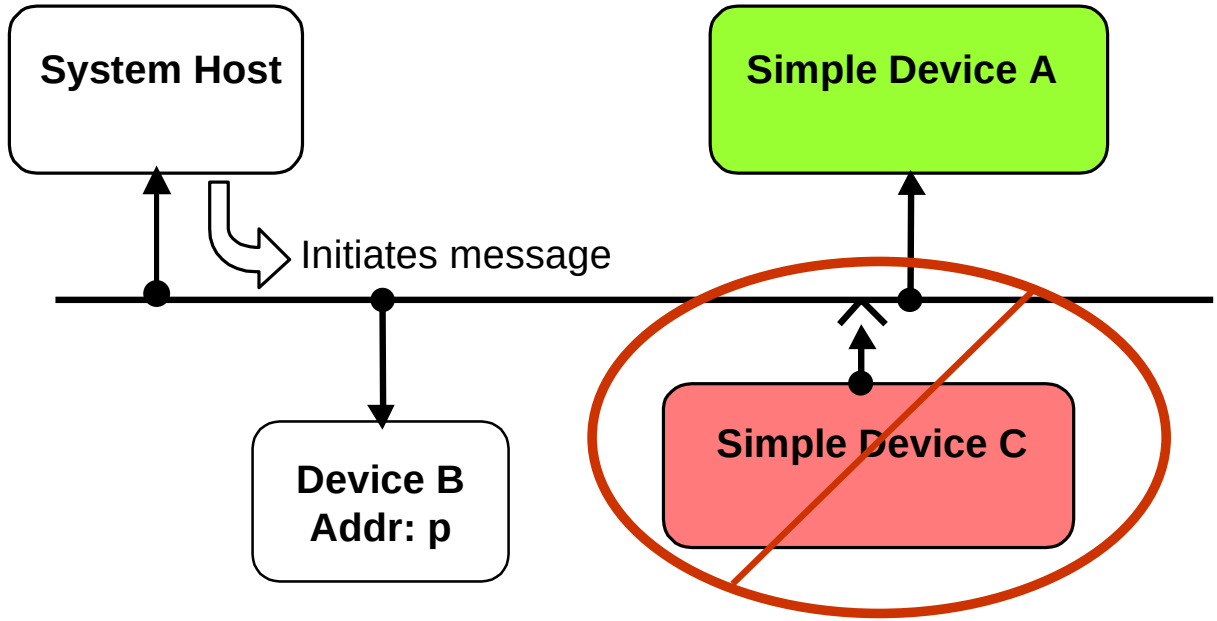


Addressable Device Model



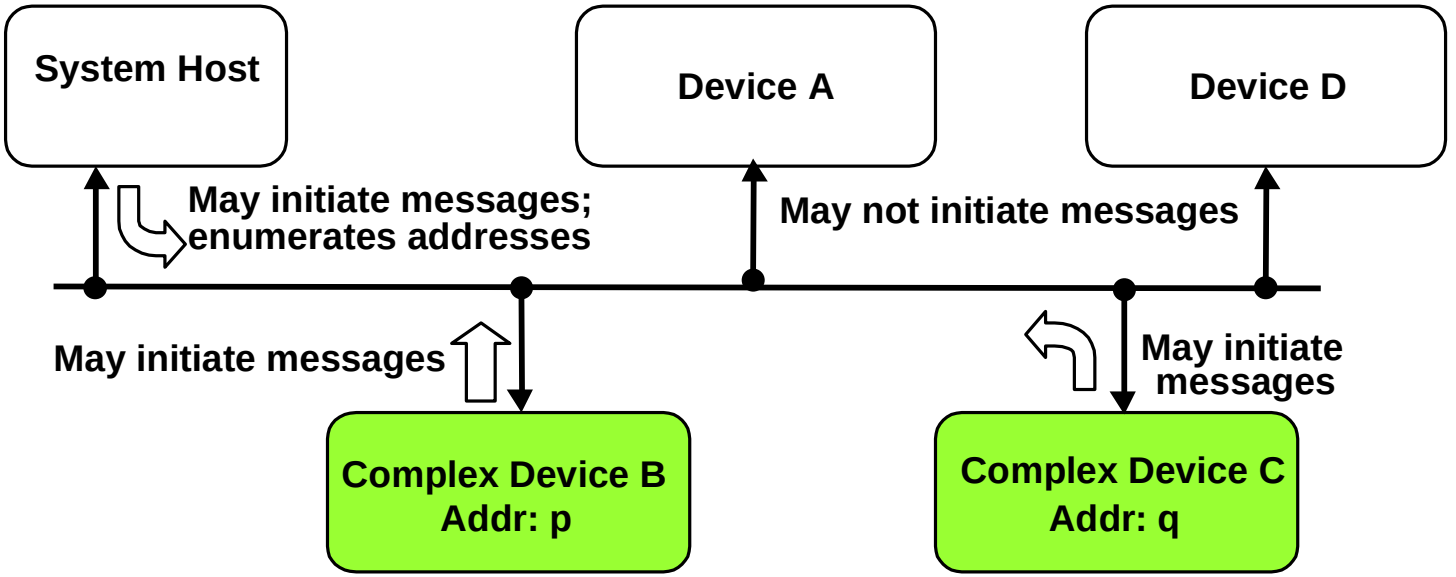
Disallowed Case

Combined Addressable-simple Models



Complex System Model

H/PC, P/PC Applications



Summary--Handheld Devices

	Type of System	Device Features
#1	Simple system (cellular phone handset)	• One Address • Point-to-point • Slave-only
#2	System that requires several devices on the bus. (power mgmt bus in handset)	• Fixed Address or • S/W Address • Multi-node bus • Slave-only
#3	Complex system (H/PC system)	• Multi-node bus • Fixed Address & • S/W Address • Master / Slave • & Slave-only

Summary--Selector Methods

- Use a selector-bridge to separate each battery from the bus unless selected
  - Selector switches power and bus lines
- Selector switches hardware enable lines
  - Introduce additionally one pin / pack
- Add software selection to the battery
  - Adds complexity to software; no switches

Physical Layer for HH Devices

Physical Layer for Handhelds

- BODIP is one alternative but not popular within the HH Data WG
- Introduce SMBus-One as a practical solution

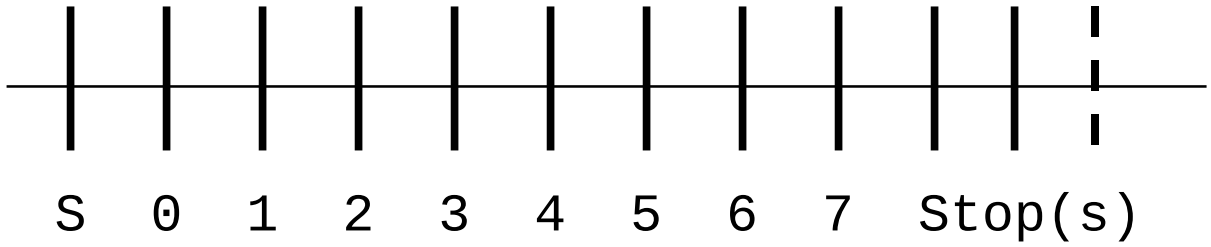
BODIP† Method from *Power'97*

- Sony defined three fields, each 16 bytes
  - 1st field = customer data
  - 2nd & 3rd field = manufacturer data
- One-way broadcasting
- Data rate = 1200bps

(†) All BODIP discussions reference material by Sony RME Company, *Power'97*, 10/97.

BODIP Protocol

- Each field has a two-byte start block (0x0707) and end block (0x8787)
- Data block in the field is 12 bytes
- Each byte contains a UART-style start bit, stop bits and 8 data bits



Concerns with BODIP

- Too slow for wide applicability
- Fixed-data rate
- One-way protocol does not please many OEM's that prefer complete control of the Host-Battery link
- Some aspects may not be Open-IP
- BODIP has variations

SMBus-One

- A new bus
- One-wire, positive logic, low-power
- Multiple data rates
- Robust data integrity
- Bi-directional transfer
- Suitable across all system models

Summary

- An SBS for handheld communications--
- SMBus-One is a simple, one-wire bus
- Good for driving costs down.
- Encompasses multi-bay battery charging
- Ensures data integrity in rough environments

Call To Action

- Actively interested?
  - Join the SBS IF as an Adopter
  - Join the HH Data Spec Working Group
- Please send comments to us at
  - hhdata@www.sbs-forum.org (Data Set)
  - smbusone@www.sbs-forum.org (Bus)