



US&S Approaches to Monitoring

Hand Throw Switch Position Track Integrity

NTSB PTC Conference
March 2-3, 2005

Architectures



- **Switch Position Monitoring**
 - **Option 1: Vital Wayside Solution (with radio)**
 - **Option 1A: Vital Wayside Solution (without radio)**
 - **Option 2: Vital Vehicle Centric Solution**
 - **Option 3: Non-Vital Solution (head end of train unit)**
 - **Option 4: Office based Solution**
- **Track Integrity Monitoring**
 - **Non-vital Sleep Mode**
 - **Vital Solution**

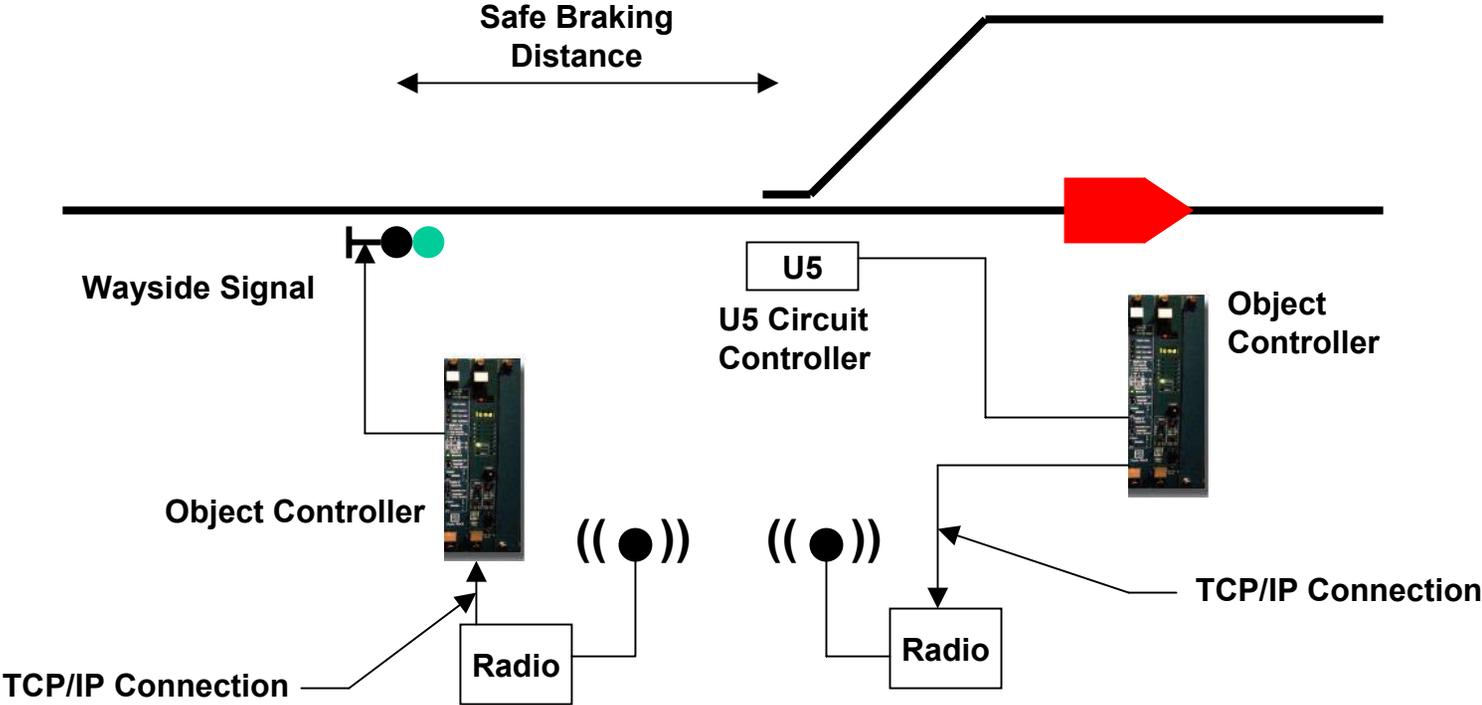
Option 1: Vital Solution

Vital Architecture

- **Switch Position**
 - U5 Circuit Controller
- **New Equipment**
 - Signal
 - Two headed signal (green over red)
 - Vital Object Controllers
 - Radios
 - Meteor Com IP radio
 - Motorola Canopy IP radio

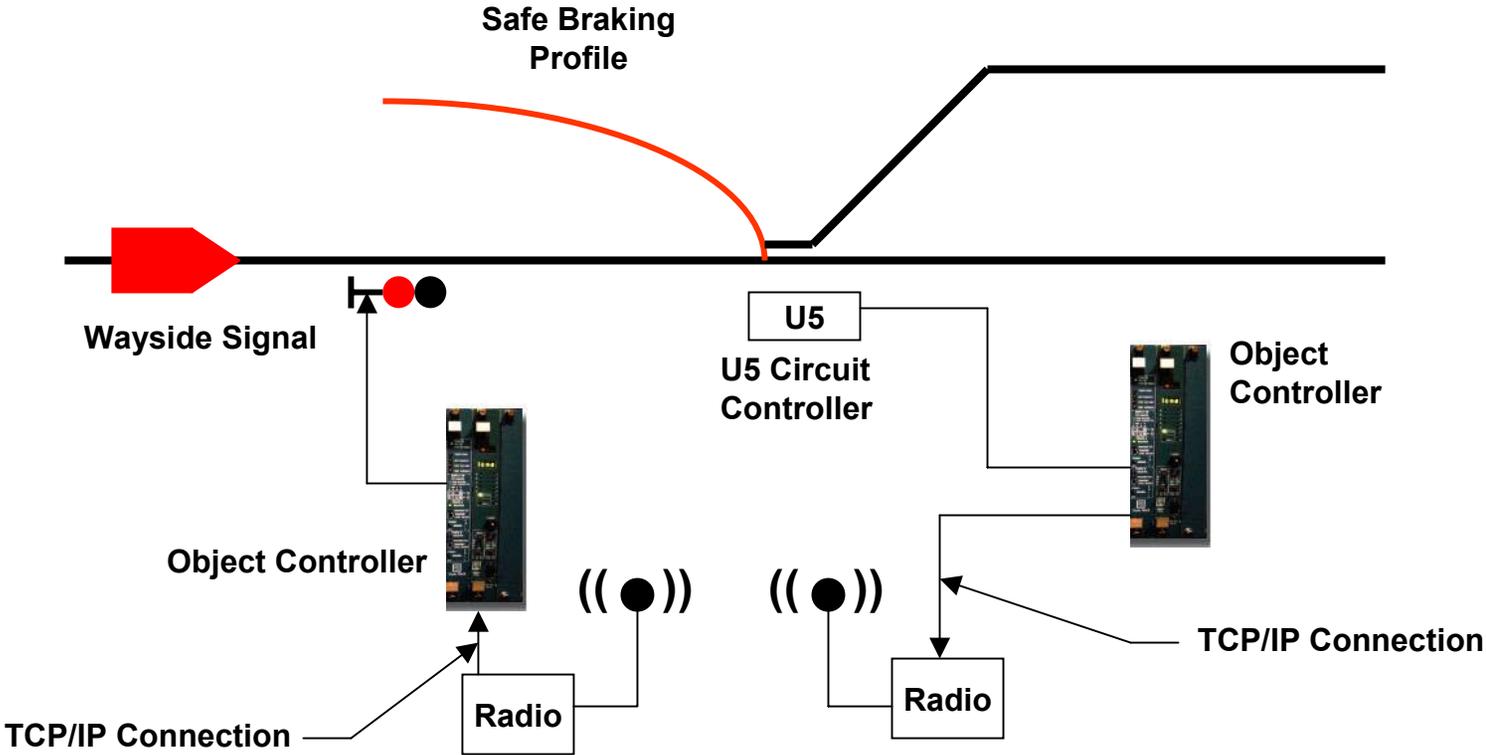
Option 1: Vital Solution

Scenario 1: Train Advance of Signal, Switch is Normal, Signal is Green.



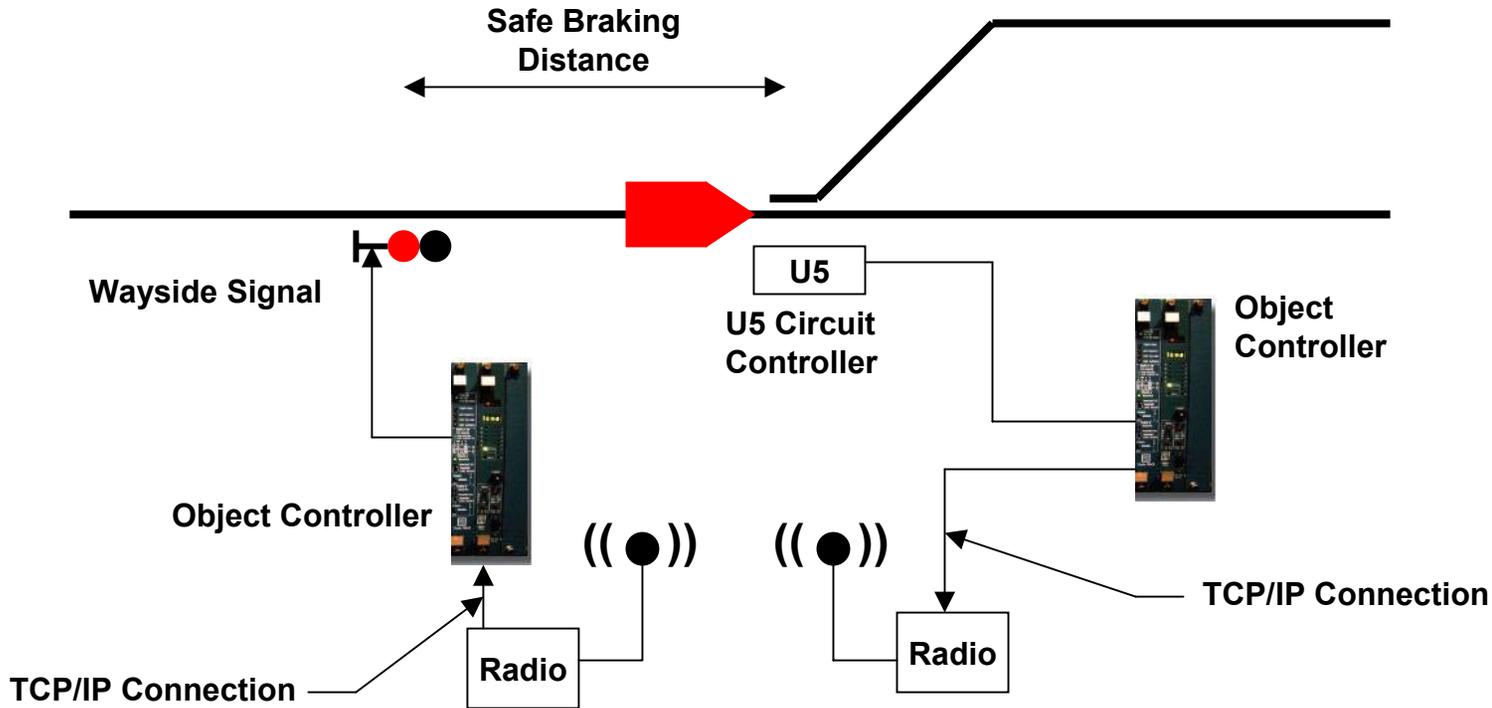
Option 1: Vital Solution

Scenario 2: Train Approaching Signal, Switch is Reverse, Signal is Red.



Option 1: Vital Solution

Scenario 2: Train Stops Short of Switch, Switch is Reverse, Signal is Red.



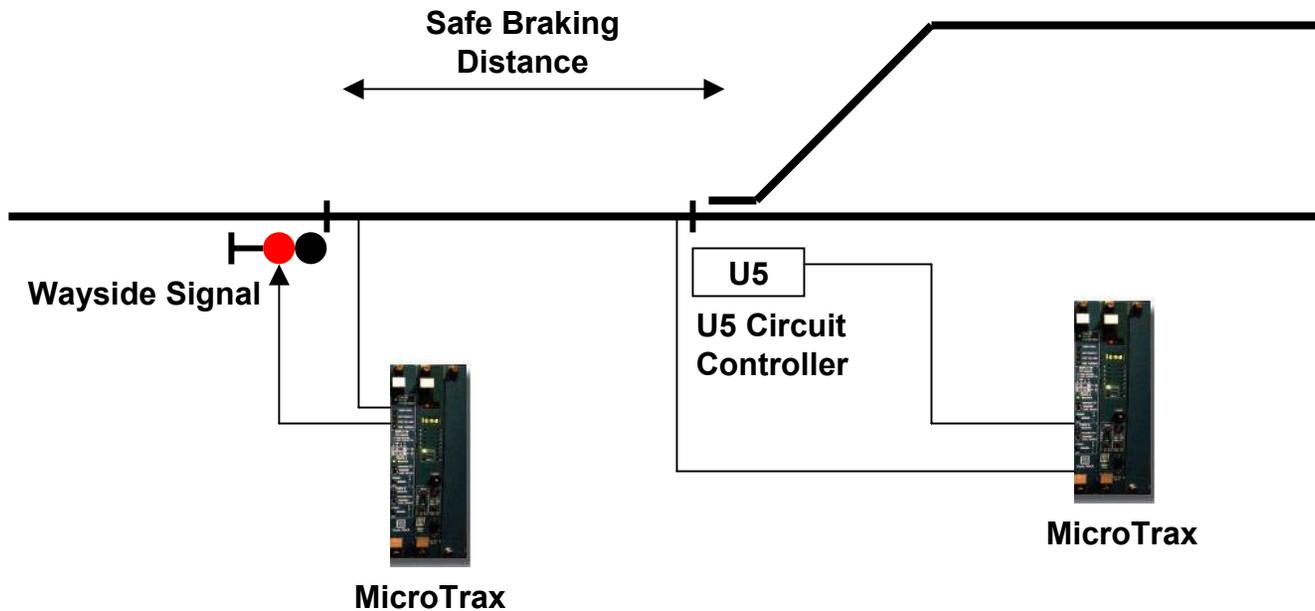
Option 1A: Vital Solution

Vital Architecture

- **Switch Position**
 - U5 Circuit Controller
- **New Equipment**
 - Signal
 - Two headed signal (green over red)
 - MicroTrax
 - Insulated Joints

Option 1A: Vital Solution

Use of Microtrax

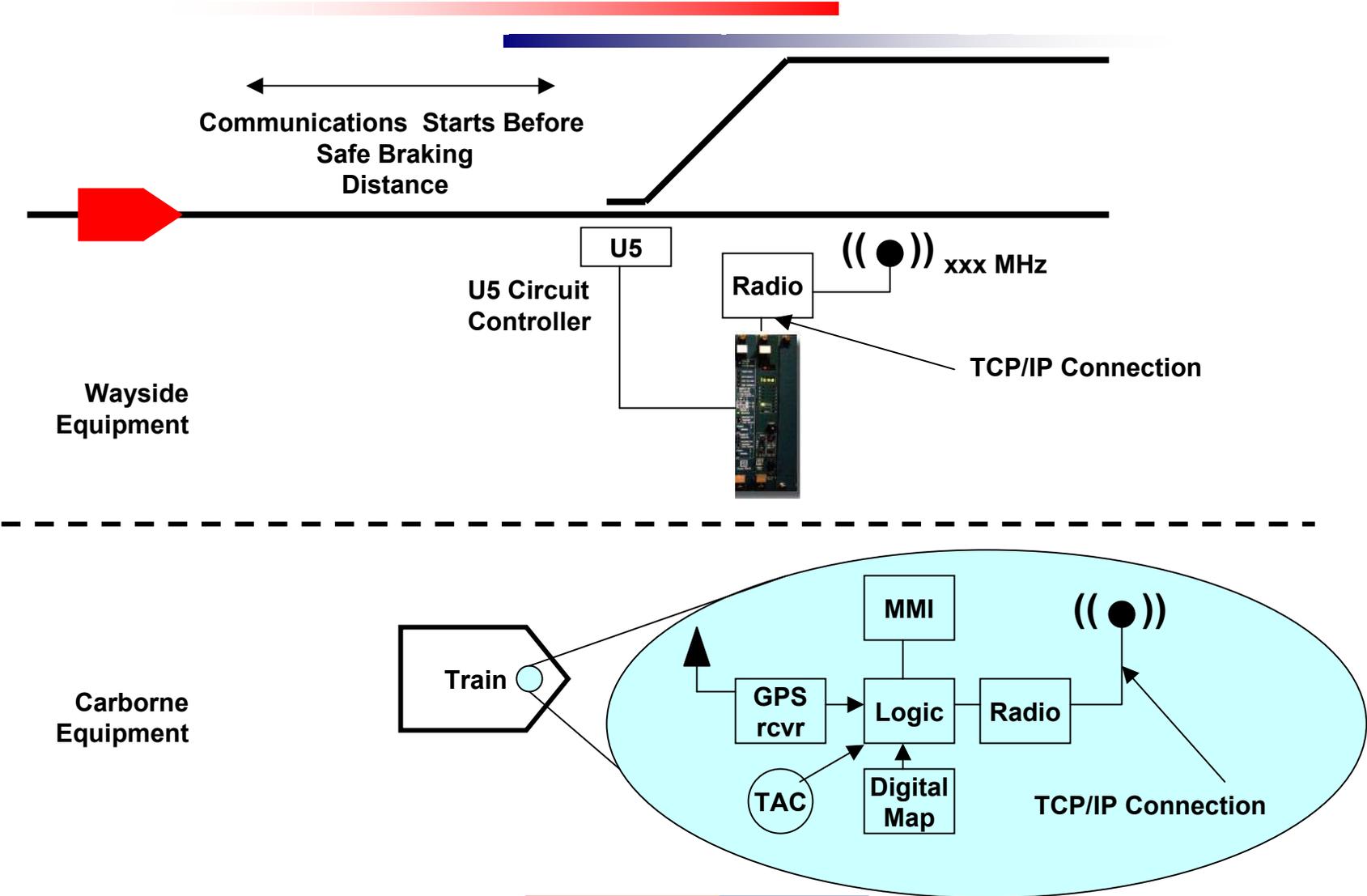


Option 2: Vital Solution (Vehicle Centric)

Vital Architecture

- **Switch Position**
 - U5 Circuit Controller
- **New Equipment**
 - Vital Object Controllers
 - Radios
 - Meteor Com IP radio
 - CAB equipment

Option 2: Vital Solution (Vehicle Centric)



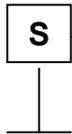
Option 3: Non-Vital Solution (HEOT)

Non-Vital Architecture

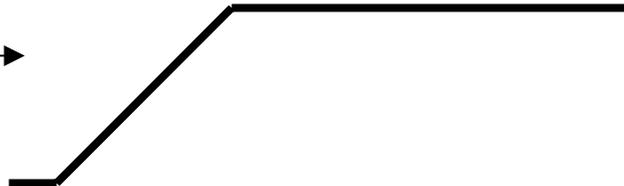
- **Switch Position**
 - Proximity Detectors or U5
- **New Equipment**
 - Wayside Communication Unit (WCU)
 - Radios
 - JDT 450 MHz Data Radio
 - Communication Display Unit (CDU)
 - Sign (optional)

Option 3: Non-Vital Solution (HEOT)

Sign to note
Communications
to start
(optional)



Safe Braking
Distance



Wayside
Equipment

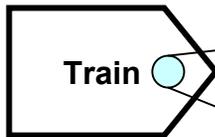
U5

((●)) 450 MHz

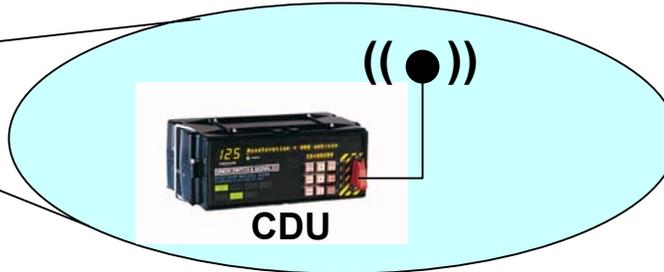


WCU

Carborne
Equipment

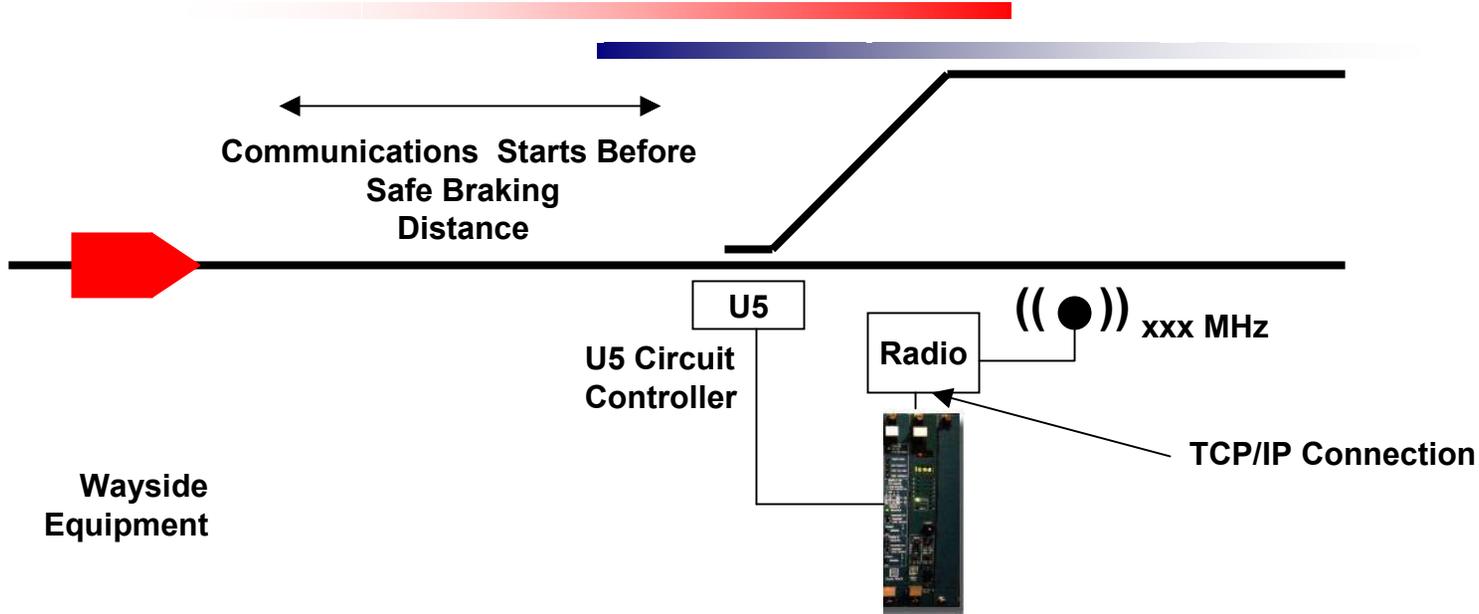


Train



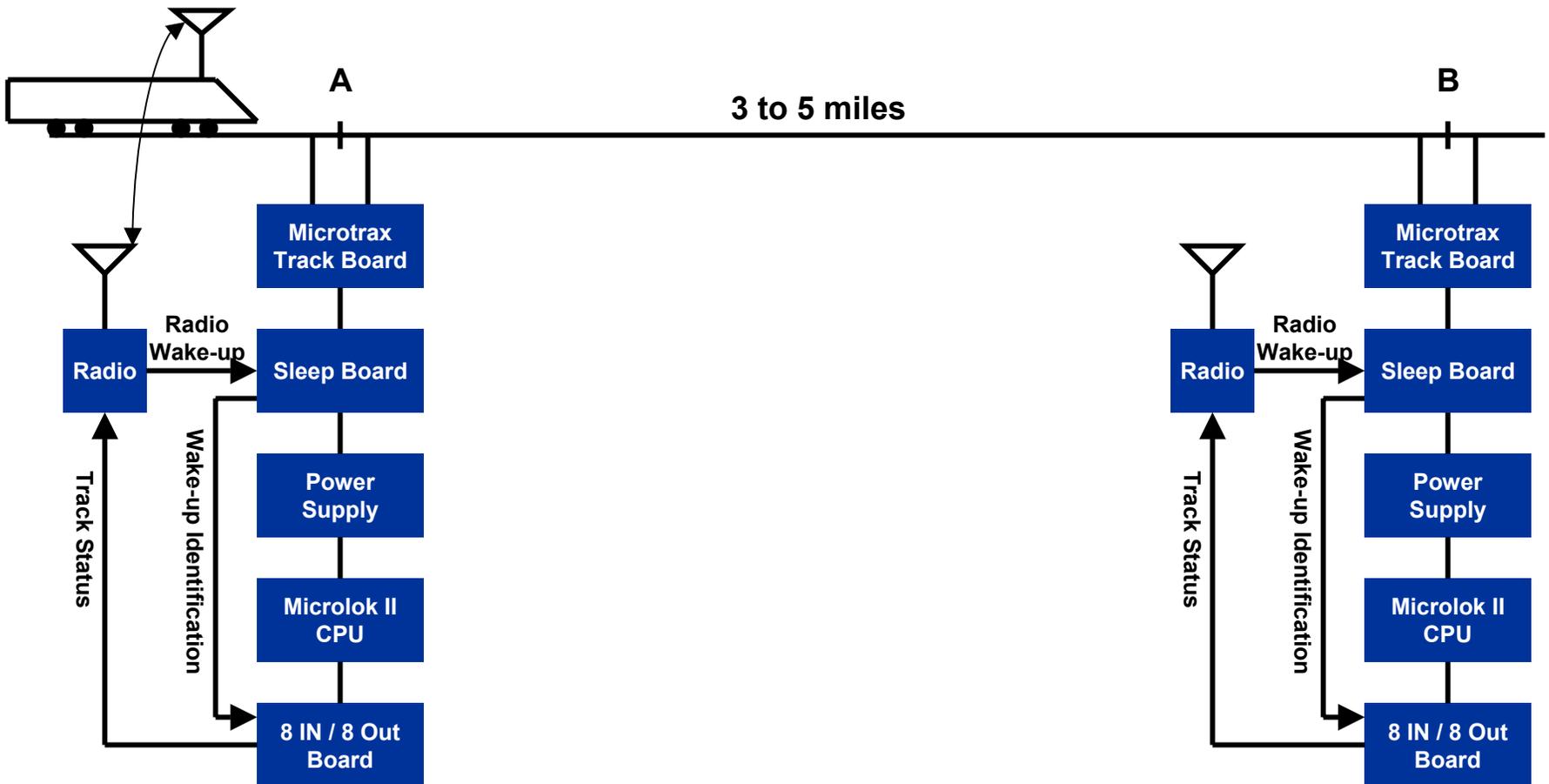
CDU

Option 4: Office Based Solution



- Add an additional radio that communicates with the Office.
- Use the Object Controller to pass information to the Office.
- Dispatcher will provide switch position information to train

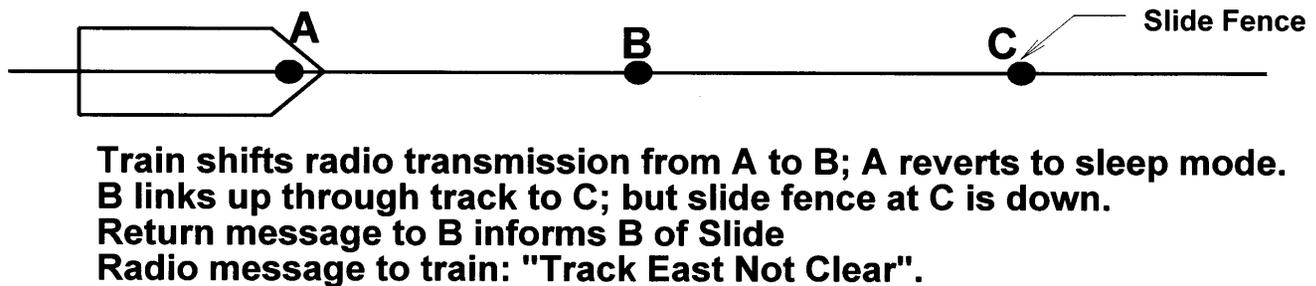
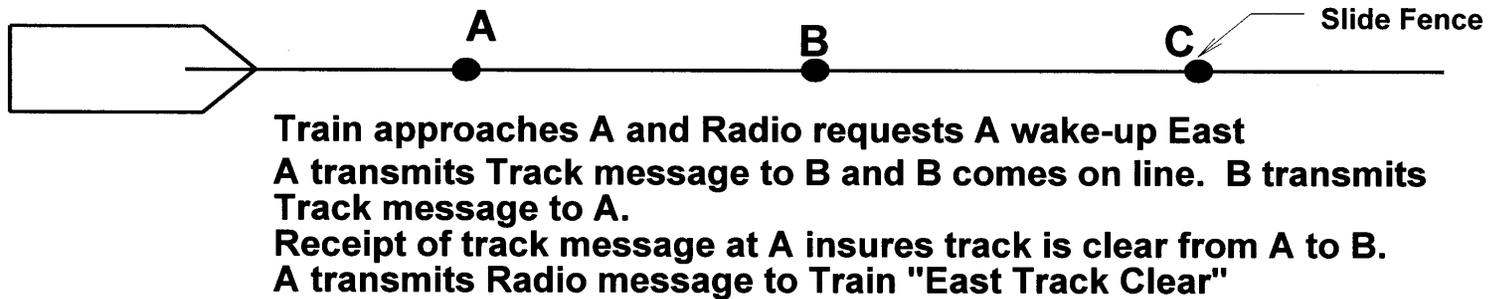
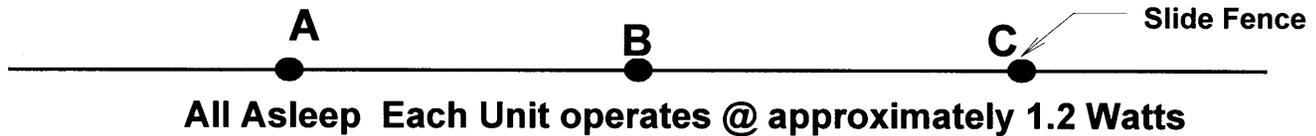
Track Integrity Detection System (Non-Vital, Sleep Mode)



Track Integrity Detection System (Non-Vital, Sleep Mode)

Sleep Mode Operation

Train Progression in Dark Territory



Track Integrity Detection System (Vital, Without Sleep Mode)

