

Remote Control Trains, Moving Block and their effects on the Future Economics of Railroading

Subtitle: “Why are long trains long?”

George Avery Grimes , P.E., PhD

TRB Rail Group Executive Board Chair

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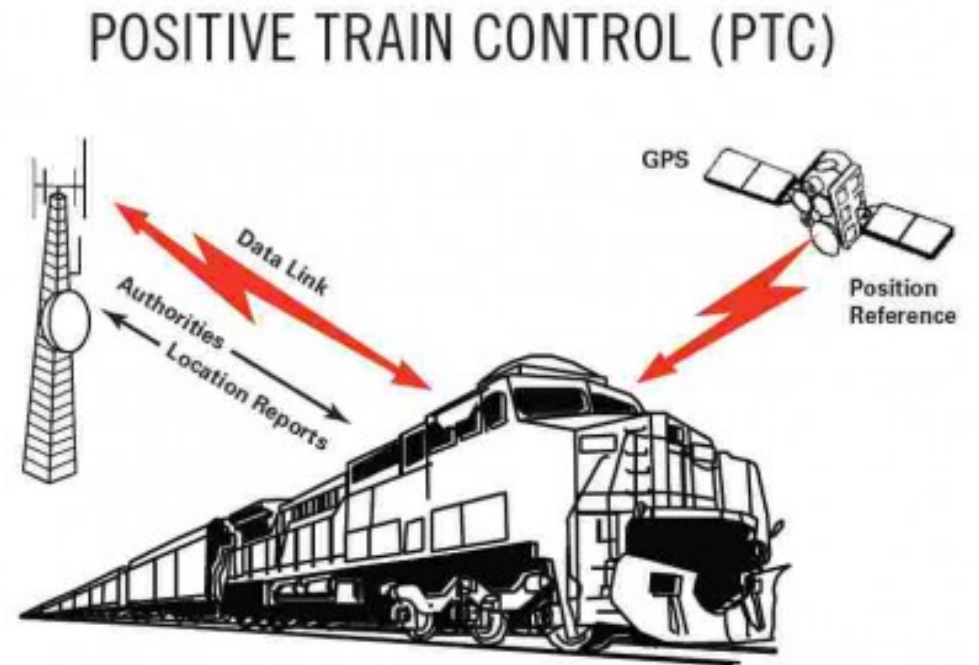
John Roberts (1958) *“But the more the long train is used to increase productivity, the poorer becomes the service to the shippers. If the long train becomes much more productive, the railroads may well find themselves without customers.”*

Outline

- PTC Capabilities leading to New Technologies
- Moving Block v. Wayside Block Signals
- Remote Control Train Operations
- Economic Effects
- Two Directions – Cut or Change?
- Service Design, Investment and Customer Benefits
- Demand Effects
- Benefits and Other Considerations
- Summary
- Thoughts for Rail Labor

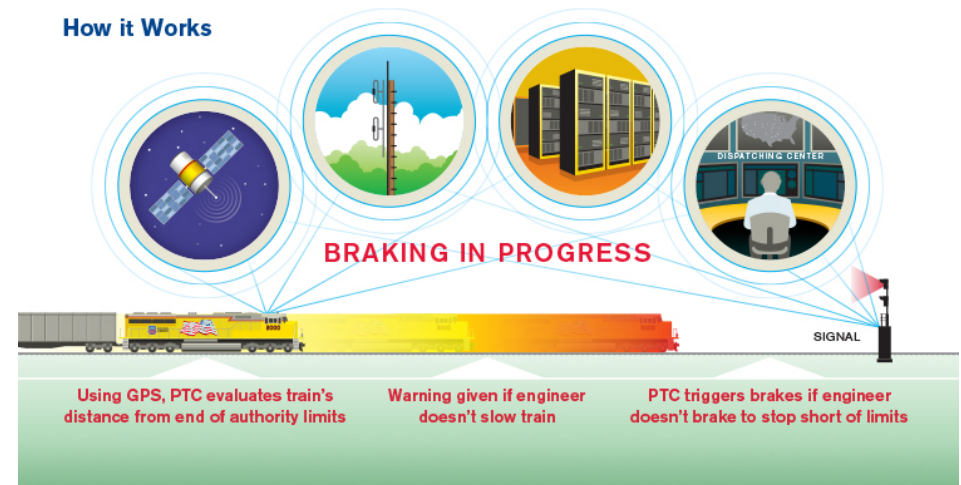
PTC will lead to other new technologies

- PTC capabilities lead to Moving Block and Remote Control Trains
 - Advanced communication
 - Precise location determination
 - Computer prompted application of throttle and brake systems
 - Integration with operating rules
 - Relative location: other trains and track activities



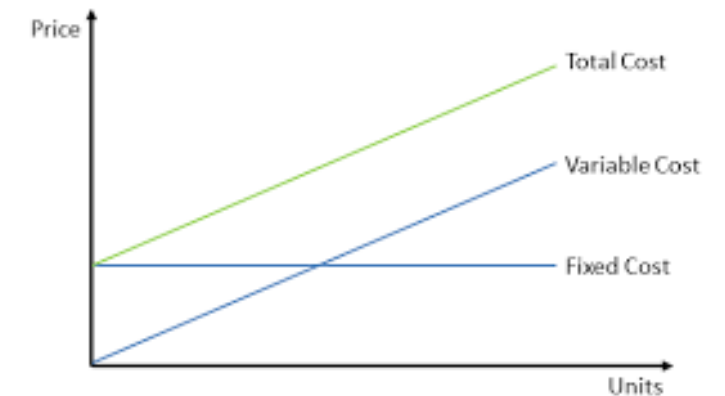
Moving Block v. Wayside Block Signals

- Wayside Signals protect trains over a given length of track which is protected by fixed signals ~ 3 mi average length block length
- Moving Block is train protection based on train length and its calculated stopping distance
- Economic Perspective:
 - Wayside Signals represents a 'fixed capacity cost' irrespective of train length.
 - Moving Block is a 'variable capacity cost' that changes with braking distance
 - Being researched



Remote Control Train Operations

- Remote Control Train concept
 - Train operator is located in a stationary location
 - Computer aided control over train operation
 - Operator may be able to control multiple trains
 - Long Haul train operational concept
- Fixed Costs
 - On-board crew = 'fixed operating cost' per train
 - Reduced by > 75% (incl. overtime, deadhead, etc.)
- Variable Costs
 - Locomotives are a 'lumpy' variable cost
 - Infrastructure maintenance is variable w/ gross tonnage
 - Fuel



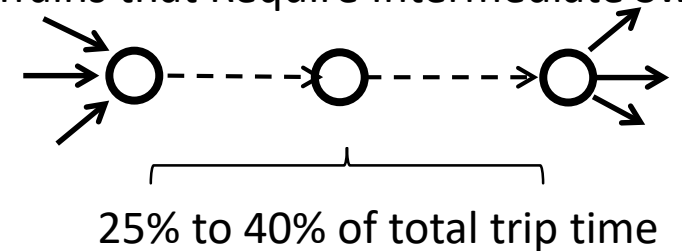
Potential Directions?

- Status Quo? For how long?
- One outcome is to only cut jobs and labor costs. No change in overall operations or service design.
 - Roving conductors, tech oriented, attrition,
 - Is this the most likely outcome?
- Another outcome is to entirely change the service design given the new economics of railroading that could be possible with these new technologies. *A different perspective...*

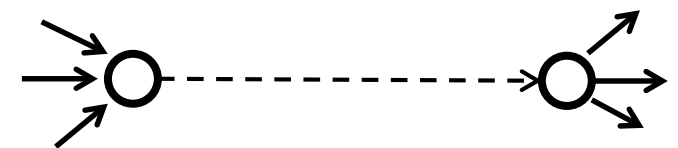
If Fixed Per-Train Costs significantly lower?

- What happens if fixed per-train operating expenses are reduced by > 75% and fixed per-train capacity costs are reduced by up to 25%
- Train size: a less important factor in operating efficiency
- Efficiencies of shorter trains begin to outweigh long-train incentives
- Potential efficiencies of short trains
 - Reduced or no intermediate switching
 - Improved car velocity & locomotive utilization
 - Reduced congestion in large terminals
 - Service reliability - less switching, fewer events

Long Trains that Require Intermediate Switching



Shorter Trains without Intermediate Switching



Service Design, Investment & Customers

- Service Design
 - Long-Haul: Shorter more frequent w O-D pairing
 - Train size optimized around locomotive capabilities
- Railroad Investment & Capacity
 - More investment in line-haul capacity, less in intermediate terminals
 - Lower equipment Investment: car utilization improvements
- Customer Benefits
 - Faster service and inventory-in-transit savings
 - More reliable service & lower equipment costs
 - Optimal train size based on customer needs and facilities



Lower Costs + Better Service = Growth

- Could O.R. drop to 50 or below?
 - Lower Costs, Increased Revenue
- Lower rates, 40% improvement in car utilization (and inventory in transit)?
- If service reliability improves?
- Secondary economic effects: rail business grows both organically and with a shift in traffic from highway to rail



Benefits and Other Issues

- Labor

- Road T&E stabilizes with more trains & more freight
- Job guarantees, productivity pay,
- Better safer work environment
- Non-T&E labor force growth?

- National Transportation Policy

- Shifting freight from highway to railroads
- AASHTO Freight Rail Bottom Line Report

- STB Economic Regulatory Changes

- R/VC formula threshold

- Rail Investors:

- Railroad value improves



Summary and Concluding Thoughts

- Benefits are significant and must be shared by railroad investors, rail customers and rail labor
- Labor and Management must work together
- Railroad management must be focused on advancing these technologies
- Public acceptance of shorter trains that can also “see, speak and listen”
- Technology is changing competition, railroads must meet the challenge
- The threat: If long haul trucks will get there first, investment in new distribution networks will be truck centric, rail industry growth will decline ... and it will be irreversible.



Thoughts for Rail Labor

- Management/Investor Considerations

- Are short-train advantages real and significant?
- Investors: short-run or long-run? Just cost cutting or change the business model?
- How much is labor cooperation worth?
- Will long term growth come? If so, how soon?

- Labor Considerations

- Fight or engage?
- How long can labor hold off changes in technology? What does history suggest?
- How will rail jobs change? Technology, types, locations.
- What is the best negotiating strategy?

Thoughts for Rail Research

- Technical – Level of Communication and Control
- Safety / Risk Management – Human Factors
- Market Logistics & Aggregation – ‘Near’ Origin/Destination
- Industrial Engineering – Customer Impacts
- Service Design – Cycle time impacts
- Economic – Direct and Indirect costs
- Investment Effects – Line, Terminal and Equipment needs