



NextGen Train Control

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What does FAA's NextGen Air Traffic Control involve?

FAA is:

- ◆ Shifting air traffic control from analog voice to digital data communications;
- ◆ Shifting from radar to GPS, augmented with WAAS, for aircraft position and speed information;
- ◆ Shifting from old to new control center computers and displays; and
- ◆ Requiring airlines and aircraft owners to equip their aircraft with on-board computers and sensors.

Why is FAA undertaking NextGen Air Traffic Control?

- ◆ FAA intends to use *continuous real-time information* regarding aircraft location and speed to:
 - Increase safety while flying more passengers, more cargo, more types of aircraft;
 - Reduce congestion and delays in the air and on the ground;
 - Improve the efficiency of airline operations;
 - Reduce aircraft fuel consumption, reduce aircraft noise, and reduce emissions; and
 - Increase the capacity of the National Airspace System.

What the FAA says and doesn't say

- ◆ FAA does not say that NextGen Air Traffic Control is **just** a system overlaid on radar to improve air traffic safety, or **just** a system to improve airline and airport efficiency.
- ◆ FAA says that NextGen Air Traffic Control consists of **integrated** systems that will improve **both** aviation safety and efficiency (but won't be tied to radar).

What are the similarities between NextGen Air Traffic Control and NextGen Train Control?

- ◆ NextGen Air Traffic Control and NextGen Train Control will both use:
 - *Continuous real-time information* transmitted over a digital data link communications network;
 - GPS positioning with WAAS augmentation to get 1 to 2 meter accuracy;
 - Graphic and textual cab displays;
 - New sensors;
 - New on-board and control center computers; and
 - Improved displays to focus on situational awareness.

Short definition of NextGen Train Control: It's what comes next after PTC

The railroad and FRA people who work on PTC have defined it as a safety-only non-vital overlay of the wayside signal systems.

Therefore, I am defining NextGen Train Control as focusing on:

- (1) improving on the safety of PTC, and
- (2) increasing the efficiency, economic viability, and profits of railroads well beyond the little that is achieved with PTC.

What should NextGen Train Control include to improve SAFETY?

- ◆ Make sure that the locations of ends of trains are known to prevent rear-end collisions. FRA regs say it is not necessary; I say it is.
- ◆ Put GPS receivers and data radios on MOW vehicles, machines, and track workers to make sure that dispatchers and trains know where they are – prevent accidents like at Chester, PA in April 2016 and at New Hyde Park, NY this weekend. Manage MOW ops the same way as train ops.
- ◆ On-board cab map displays showing track configuration and profile; engineers on trains that overturned in Philadelphia in June 2015 and at Spuyten Duyvill in December 2013 lost situational awareness.
- ◆ Write a new and simplified rule book for NextGen – to replace NORAC and GCOR - that reflects the new paradigm of train operations

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What should NextGen Train Control include to improve SAFETY? (continued)

- ◆ Switch position indicators should be installed on ALL switches
- ◆ Investigate systems for improving detection of broken rails with something other than track circuits. (Recent Canadian TSB report mentions 6 derailments caused by broken rails at insulated joints that were not detected by track circuits.)
- ◆ Incorporate Intelligent Grade Crossings (like on Amtrak's ITCS in Michigan) into both NextGen Train Control and Intelligent Transportation Systems programs. FHWA, FRA, and the AAR worked together in the late 1990s to develop the specifications for Intelligent Grade Crossings, and they are in the ITS National Architecture.

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What should NextGen Train Control include to improve SAFETY? (continued)

- ◆ Implement emergency notification systems in the control centers. Netherlands Railways have been marketing their system for some years now.
- ◆ ALL lines that have passenger trains and ALL lines that carry crude oil, ethanol, and other hazardous materials besides PIH and TIH should be equipped with NextGen Train Control; there should be no exceptions for short lines, or terminal exemptions such as at Hoboken Terminal.
- ◆ PTC implementation be continuous on through routes with no interruptions of coverage for intermediate sections where there is insufficient PIH and TIH traffic.

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What should NextGen Train Control include to improve SAFETY? (continued)

- ◆ Connect the GPS receivers in the PTC system to the event recorders and download train location, train speed, and time information to them; simpler and more accurate than counting axle rotations.

What should NextGen Train Control include to improve EFFICIENCY?

Integrate the following info systems:

- ◆ AEI consist data and UMLER data for train length and weight info for the braking algorithm;
- ◆ Work order reporting system for set-outs and pick-ups, and keeping consist info current also for the braking algorithm;
- ◆ Locomotive health info (in particular, air and dynamic brake status) also for the braking algorithm;
- ◆ Energy management system (e.g., NYAB's LEADER system) to reduce fuel consumption and emissions;

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What should NextGen Train Control include to improve EFFICIENCY? (continued)

The first of two BIG items:

- ◆ New control center computers that will manage the shift from fixed block to moving block operations, and will integrate:
 - Precision Dispatching;
 - Tactical Traffic Planning;
 - Strategic Traffic Planning;
 - Locomotive and Freight Car Scheduling; and
 - Crew Scheduling.
- ◆ They will keep trains on schedule so that locos, cars, and crews don't need to be rescheduled.
- ◆ Should be carried out collaboratively by all the major railroads overseeing a single team of contractors.

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What should NextGen Train Control include to improve EFFICIENCY? (continued)

The second of two BIG items

- ◆ Electronically-Controlled Pneumatic (ECP) Brakes will enhance railroad efficiency when integrated with NextGen Train Control.
- ◆ Benefits of ECP brakes include:
 - shorter braking distances;
 - improved running time because the brake system does not have to be recharged after a stop;
 - improved train dynamics resulting from the simultaneous application of the brakes;
 - reduced wear on wheels, brake shoes, and rails; and
 - reduced fuel consumption resulting from having to accelerate from fewer stops for recharging the brake system.

What is needed to successfully implement NextGen train control?

- ◆ Don't limit yourselves to what FRA requires; you are free to do more than the minimum that FRA requires.
- ◆ Systems thinking on the part of the entire railroad.
- ◆ **Total** support from the senior executives.
- ◆ A team consisting of full-time representatives from EVERY department that will be affected by NextGen Train Control:

Operations Planning
Transportation
Dispatching
Mechanical
Track Maintenance
Signaling
Telecommunications

Marketing & Pricing
Information Systems
Safety & Rules
HR & Training
Labor Relations
Finance
Corp Communications

Can NextGen Train Control actually be pulled off?

- ◆ I believe that the answer is yes, but it takes a commitment to changing the paradigm by which railroads operate in order to make them safer, more efficient, and more profitable.
- ◆ Look at the FAA's NextGen ATC Implementation plans.
- ◆ Look at FRA's PTC Business Benefits analysis of 2004, which actually envisioned NextGen Train Control.
- ◆ Look at BN's published material on the ARES project, which foreshadowed much of NextGen Train Control.
- ◆ NextGen Train Control is all about ensuring that timely and accurate information gets where it's needed, when it's needed, and to those who need it most.

And here's an expanded definition of NextGen Train Control

- Improved safety;
- Improved situational awareness:
 - ◆ For engineers as they approach curves and grades; and
 - ◆ For engineers and dispatchers to know the location of MOW equipment and personnel;
- Improved security;
- Greater effective track capacity;
- Improved asset utilization – locos, cars, crews;
- Improved running time and running time reliability;
- Improved customer satisfaction;
- Ability to measure and control costs;
- Reduced energy consumption and emissions;
- Ability to manage the unexpected; and
- Increased economic viability and profits.

Questions?

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