

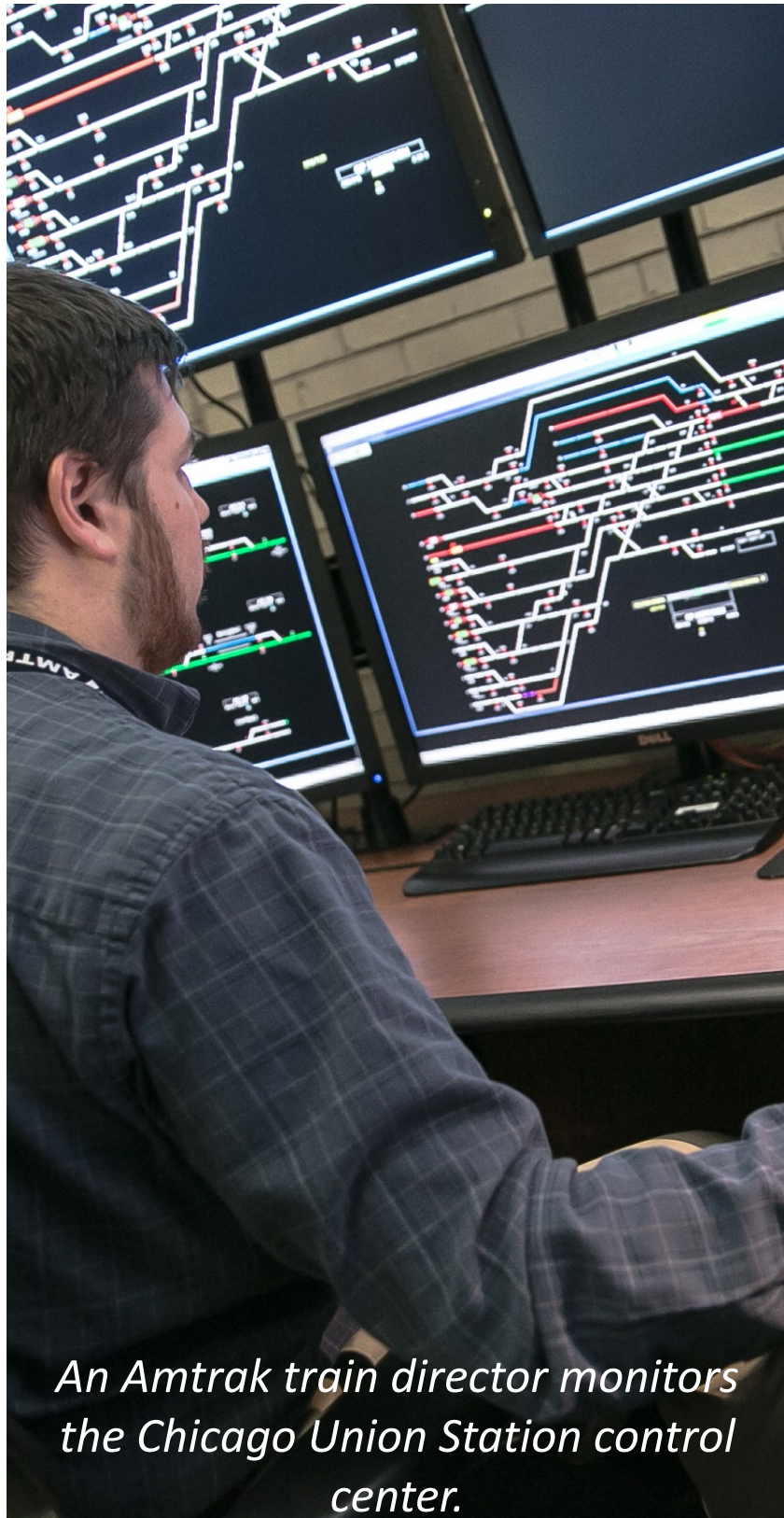


AMTRAK:

COAST TO COAST IMPLEMENTATION OF PTC

January, 25 2019

PTC Overview – What Does PTC Do?

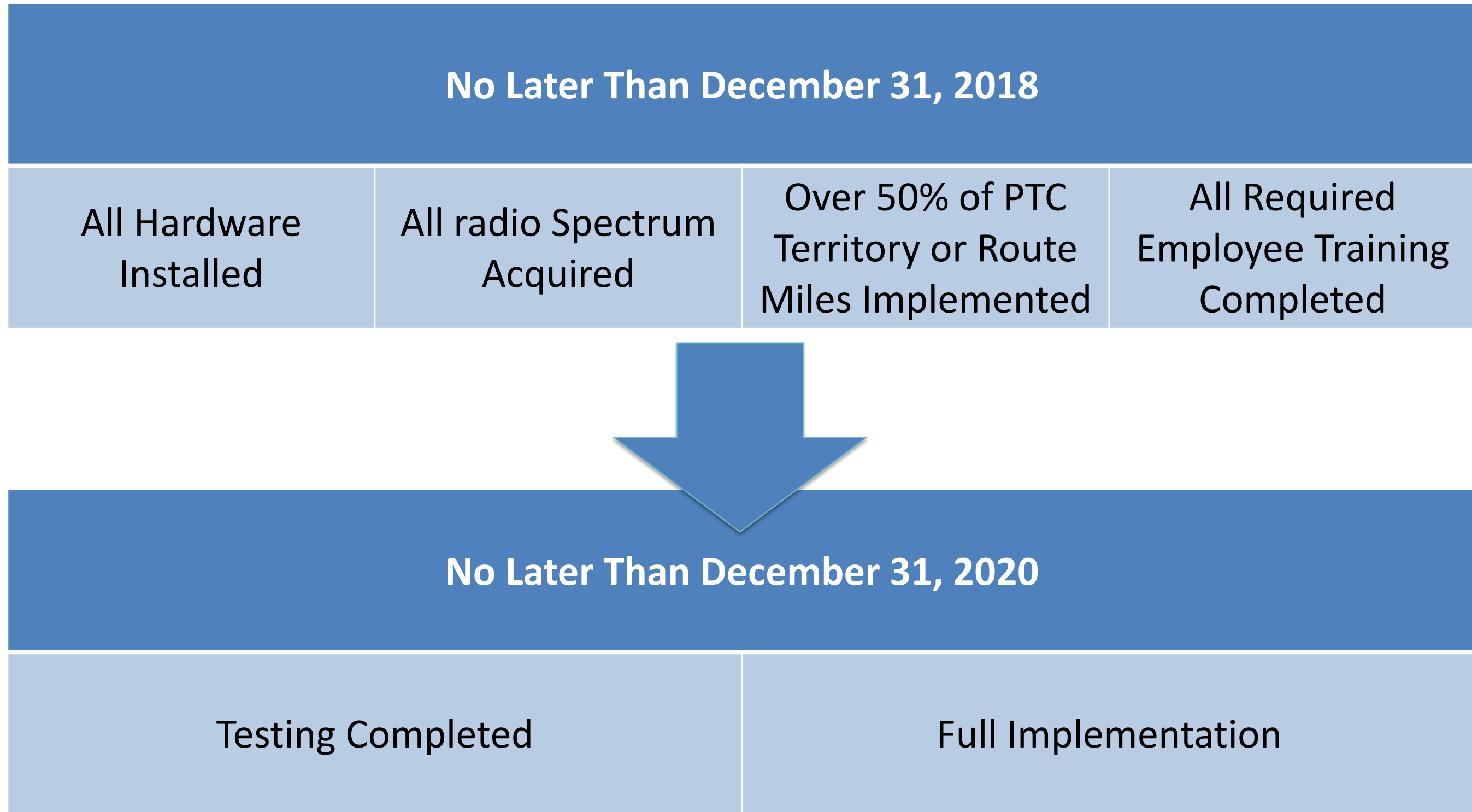


An Amtrak train director monitors the Chicago Union Station control center.






PTC systems that meet the standards set by FRA regulations are required to reliably and functionally prevent:

- ✓ Train-to-train collisions;
- ✓ Over speed derailments;
- ✓ Incursion into an established work zone; and
- ✓ Movement through a main line switch in the improper position.
- ✓ Other functions are applicable within the requirements as specific conditions warrant.

PTC Regulation – Statutory Deadlines for Class I and Amtrak



Who is Responsible for PTC Installation?

<i>Component</i>	<i>Responsible Party</i>
 PTC Infrastructure	➤➤➤ Rail infrastructure owner/operator
 Wayside Infrastructure	➤➤➤ Rail infrastructure owner/operator
 Testing	➤➤➤ Rail infrastructure owner/operator, Equipment owner/operator
 Locomotive and onboard systems	➤➤➤ Equipment owner/operator
 Back office servers	➤➤➤ Shared; host railroads require back office server, Amtrak and other operators also needs one to communicate with multiple host servers

Overview – Amtrak and PTC



For Amtrak's purposes, there are 2 approaches for the use of PTC

- ✓ PTC technologies that we own/operate and have installed on our infrastructure (Host)
- ✓ PTC technologies that have been chosen by other carriers for their infrastructure that Amtrak's locomotives and cab cars must operate and communicate with (Tenant)

Amtrak's PTC = ACSES, ITCS

- ✓ Approved by FRA, provide all elements of PTC
- ✓ In use on the NEC (ACSES) and Michigan Line (ITCS)

Freight carriers' and some other commuter RRs' PTC = IETMS

- ✓ Class I freight carriers and many commuter systems outside the NEC use the Interoperable Electronic Train Management System (I-ETMS)
- ✓ I-ETMS provides all the elements required for PTC

An Amtrak technician resetting a PTC transponder in Pennsylvania along the Northeast Corridor.

3 different PTC systems on Amtrak's Network

Advanced Civil Speed Enforcement System (ACSES)

- ✓ In service on the NEC since 2000
- ✓ Used by multiple northeast commuter agencies
- ✓ Vital overlay used to support 150 MPH operation
- ✓ Transponder based train positioning
- ✓ Almost all of Amtrak's NEC main spine was implemented by December 2015

Incremental Train Control System (ITCS)

- ✓ Vital overlay used in Michigan to support 110 MPH operation
- ✓ GPS based train positioning
- ✓ Current version in service since 2011

Interoperable Electronic Train Management System (I-ETMS)

- ✓ Non-vital overlay used by all Class I freight carriers and many commuter agencies outside the northeast that supports 90MPH operation
- ✓ GPS based train positioning
- ✓ Braking algorithm based on actual consist
- ✓ Back Office Servers (BOS) must be "Federated"

Interoperability by the Numbers

	Tenants on Amtrak	Amtrak as Tenant
ACSES	10	3
ITCS	1	0
I-ETMS	3	20

An Amtrak technician resetting a PTC transponder in Pennsylvania along the Northeast Corridor.

Locomotives for 3 different systems

Total Fleet			PTC Equipped Fleets	Current I-ETMS (PTC) Fleet Commissioned through Campaign 51	Current ACSES (PTC) Fleet Commissioned	Current ITCS (PTC) Fleet Commissioned ¹
I-ETMS	ACSES	ITCS				
6			F59 Locomotives*	6		
18		2	P32-8 Locomotives	13		0
18	18		P32 Dual Mode Locomotives	18	18	
8			Surfliner Cab Car	8		
18	4		NPCU (Formerly F40)	18	4	
184	38	10	P42 Locomotives**	165	38	8
13			P40 Locomotives	13		
4			GENSET Locomotives	2		
	68		ACS-64 Locomotives		68	
	15		9600 Series Cab Cars		15	
	40		Acela Power Cars		40	
	30		Work Engines		30	
15			CA F59 Locomotives	15		
22			CA Charger SC-44 Locomotives	20		
14			CA Cab Cars	13		
8			CA Surfliner Cab Cars	8		
2			CA P32-8 Locomotives	0		
28		28	MW Charger SC-44 Locomotives	22		0
8			NC F59PH Locomotives	7		
5			NC Cab Control Units	0		
3			OR NPCU	3		
2			OR Talgo Series 8 Cab Cars	2		
7			WA Charger SC-44 Locomotives	7		
383	213	40		340	213	8

*F59 locomotives are scheduled to be disposed by 12/31/18 subject to Charger deliveries. All but 6 Amtrak owned F59s have been sold/transferred.

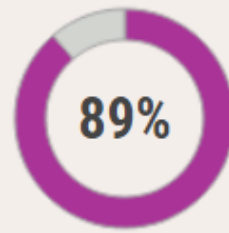
**P42 requirements are assuming 100% of Charger are commissioned by 12/31/18. 1 previously commissioned P42 is in wrecked status.

¹ITCS numbers updated to reflect the new requirements based on Alstom software upgrade.

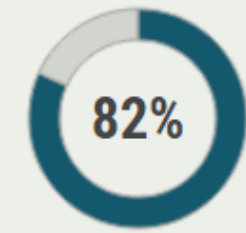
FRA Status Report – Q3 2018

INTERCITY PASSENGER RAILROADS

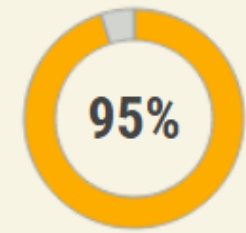
ATK *
AMTRAK



416/469
LOCOMOTIVES



9/11
TRACK SEGMENTS



137/144
TOWERS



2,050/2,050
EMPLOYEES



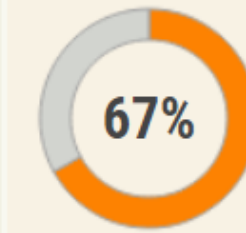
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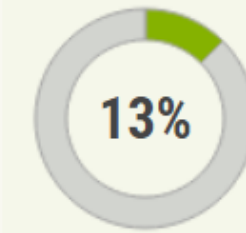
MILES



**CONDITIONALLY
CERTIFIED**



603/901
MILES



2/16
RAILROADS

* This infographic reflects Amtrak's self-reported progress implementing ACSES II on the Northeast Corridor and ITCS in Michigan. However, please note that this infographic does not reflect Amtrak's readiness to operate PTC-equipped locomotives on all other route miles subject to the statutory mandate throughout the United States.



PTC Implementation Status

Effective 1/1/2019

- PTC in Service
- PTC completed by 12/31/19
- PTC completed by 12/31/20
- PTC not required
- MTEA track scheduled for PTC



Challenges

Reliability

- ✓ Software in Development
- ✓ Interoperability Increases Complexity

Limited Resources

- ✓ Vendors
- ✓ Knowledgeable Railroad Staff

Regulatory Review

- ✓ FRA review workload
- ✓ Government Shutdown

