Consultation feedback report

Scope of Tier 1 mandatory standards for digital train control

30 October, 2025

Contents

1 Introduction

Infrastructure and Transport Ministers have tasked the National Transport Commission (NTC) to work with all governments and industry to develop the first mandatory interoperability standards to avoid a 'digital break of rail gauge'. A three-tiered national rail standards framework has been agreed to by Ministers, with a 'must do', 'should do' and 'can do' logic:

- Tier 1 - What must be done to ensure interoperability and safety across Australia's rail networks (mandatory standards).
- Tier 2 – Harmonised standards, rules and ways of working to lift safety, improve capacity, reduce costs, support local manufacturing and create a skilled, mobile workforce.
- Tier 3 - What might be done to lift efficiencies on individual networks (local standards).

Ministers have agreed to three Tier 1 standards to ensure a consistent baseline of safety, technical performance, and operational integrity across the industry. These standards will be mandatory.

NTC has been investigating the scope and technical requirements for the first two Tier 1 mandatory interoperability standards to support a European Train Control System (ETCS) implementation pathway across the National Network for Interoperability (NNI), which was endorsed by Ministers in August 2025. These are:

1. Digital Train Control Technology (DTCT)Trackside – envisaged as a standard setting out the trackside/infrastructure requirements to ensure interoperability between DTCT deployments across the NNI. This standard would be used by Rail Infrastructure Managers (RIMs) to design, deploy and manage their DTCT implementation.
2. DTCT Onboard – envisaged as a standard specifying the requirements for on-board train fitment to ensure DTCT compatibility across the NNI and a consistent on-board interface for drivers and crew. This standard would primarily be used by Rolling Stock Operators (RSOs), leasing organisations and others to fit and manage onboard DTCT-related equipment.

The third mandatory standard to streamline rolling stock approval processes will be developed separately.

To inform the scope of the first two mandatory standards, in June 2025 the NTC released a discussion paper for consultation, Digital Train Control Technology Interoperability Requirements Assessment. The paper:

- considered the structures and lessons learnt from ETCS deployment over the last 20 years, taking a whole-system perspective, encompassing trackside and onboard components,
- looked at ways the European Technical Specifications for Interoperability (TSIs) could be leveraged in Australia, and

- assessed the critical factors that must be specified or aligned to achieve interoperability in a co-regulatory environment.

The Interoperability Requirements Assessment identified four key elements to ensure interoperability:

1. **Alignment with EU TSIs** to ensure that all ETCS implementations in Australia align with an agreed application of the European Union Agency for Railways' (ERA)TSI. It should be noted that not all elements of the TSIs will be relevant in Australia.

2. **Common certification of onboard installations for compliance to ETCS specifications** to ensure that a vehicle fitted with compliant ETCS and radio equipment can travel unhindered and efficiently across the NNI.

3. **Flexibility in trackside implementations** to give RIMs some flexibility in how ETCS is deployed trackside – within defined boundaries – to address specific network needs. Certified vehicles must remain compatible with all trackside configurations. Wherever feasible, deployments will be based on a limited number of generic configurations to permit close alignment of operating arrangements and rules.

4. **National coordination** to manage updates to the TSIs and provide clarity for application in Australia, as well as managing standards and non-compliances, overseeing certifications, and coordinating national planning.

The Interoperability Requirements Assessment is premised on mandating in a Tier 1 standard only those requirements that are necessary for interoperability, whilst permitting flexibility in other areas.

Stakeholders from across the rail industry were briefed via an online public webinar and workshops throughout June 2025. In total, over 110 people representing 44 different groups and entities attended the workshops.

The discussion paper invited detailed feedback to 30 questions. Responses were received from 27 different entities and individuals, including 9 Rail Infrastructure Managers, 7 Rolling Stock Operators, equipment suppliers, industry bodies including the Australian Railway Association (ARA), Office of the National Rail Safety Regulator (ONRSR), Rail Industry Safety and Standards Board (RISSB) and the Institution of Railway Signalling Engineers (IRSE).

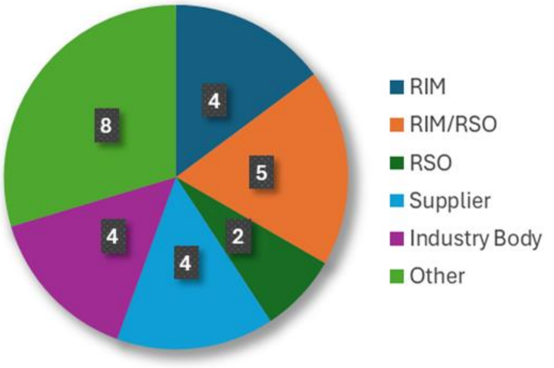

Figure 1. Breakdown of organisations and entities providing feedback

This report provides a summary of the feedback received and will be used to inform the development of the first two mandatory standards.

2 Summary of Stakeholder Responses

2.1 Interoperability Frameworks

2.1.1 Definitions

The following table provides a summary of the feedback relating to the definitions proposed for interoperability and for DTCT, and the NTC's response and proposed actions.

Table 1. Summary of feedback: Definitions

Summary of feedback	Response and actions	Scope Treatment
Definition of Interoperability **Stakeholders were asked to comment on the following proposed definition:** **'Interoperability' means: making sure that any train, no matter what network it is going over, can operate so far as practicable at the highest level of safety and productive performance the network offers.**		
Intent of proposed definition supported with suggestions to increase clarity: • **It will be imperative that the definition of interoperability is aligned between any changes in the *Rail Safety National Law (South Australia) Act 2012* (RNSL) mandatory standards, other RISSB products, governance arrangements and other related items.** • **This definition may be better expressed as 'Operational Interoperability' to avoid ambiguity and refer to the context referring to the physical movement of trains (as opposed to 'technical interoperability' which is an understood prerequisite).** • **To remove the 'so far as is practicable' terminology which implies a safety case linkage, and if this is intentional should be aligned with the RSNL definition.** • **Include network transitions to confirm that the boundaries between networks are included (the current definition may imply it is only covered when wholly within one network or another).**	The NTC will refine the definition to provide greater clarity in changes to RSNL and the Regulatory Impact Statement for the emerging national requirements: • It is agreed that an aligned definition of 'interoperability' must be used across all critical documentation. • Given the planned use of technology and frameworks derived from Europe it will be beneficial to maintain a definition of Interoperability that is closely aligned with the one used in Europe • Provide clarity in relation to operational vs technical interoperability. • The use of the expression 'so far as is practicable' in the definition is intended to recognise that achieving the highest level of safety and productive performance (i.e. the strict wording of the definition) will not always be achievable in practice. • The definition focuses on achieving safe and efficient movement of trains across the NNI. This is relevant as trains cross network boundaries, plus when a train is wholly within one network. The current definition does not intend to create a distinction between these two circumstances.	The definition of interoperability will be refined further and will align closely with the European definition as the standards are drafted and RSNL amendments progressed.

<table>
<tr><th>Summary of feedback</th><th>Response and actions</th><th>Scope Treatment</th></tr>
<tr><td colspan="3">Definition of DTCT
Stakeholders were asked to comment on the following proposed definition:
‘DCTC includes:
• ETCS Onboard train protection/control equipment, and
• Onboard data radio equipment supporting transmission of ETCS data, and
• ETCS Trackside train protection/control equipment, and
• ATO (over ETCS) Onboard, and
• ATO (over ETCS) Trackside, and
• FRMCS Trackside data radio, and
• Conventional signalling elements used in conjunction with the above, and
• Network Control / Traffic Management Systems used in conjunction with the above.</td></tr>
<tr><td>Generally supported, noting the following challenges to the scope and context of the proposed definition:
• If it is intended that DTCT is ETCS-specific, it should be clarified why this term is used rather than ETCS/ERTMS (including clarifying the differences between DTCT & ETCS/ERTMS)
• Should specify which voice/data radio elements are included and excluded and why (and if transitioning to FRMCS is a requirement or if the definition only applies ‘as applicable’ for RIMs that are planning to make this transition). If mission-critical voice communications is to be excluded, then this should refer to the accompanying standard that will be closely related to this one to ensure full interoperability can be realised.
• Clarify if key management is included or not.</td><td>The definition of DTCT presented in the Interoperability Assessment is implicitly derived from the remit currently agreed by ITMM for the Tier 1 mandatory standards.
Based on the feedback received, it is recognised that the alignment of mission critical voice communication is also essential to effective operation across the NNI. Including this in a mandatory standard would also align with the scope of European CCS TSI and may provide greater standardisation of the approach to be used in Australia. This issue is discussed further in Section 3.
With respect to the other items noted in the summary of feedback (column to the left):
• The term DTCT is being used for a set of systems that is wider than just ETCS, but where ETCS is a core subsystem. For example, FRMCS (included within the current DTCT definition) is not part of ETCS.
• Key management is an ETCS requirement and falls within the current definition as a component of ETCS.
As with the definition of Interoperability, it will be beneficial to maintain alignment of the definition of DTCT with those elements that are specified in the ERA’s CCS TSI. Wider issues, such as standardising interfaces between TMS-TMS, TMS-RBC, IXL-RBC and IXL-IXL, may be considered for Tier 2 standards.</td><td>DTCT to be defined in the mandatory standards.</td></tr>
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2.1.2 Lessons Learnt

Stakeholders generally acknowledged the lessons learnt from European deployments, as set out in the Discussion Paper, but also recognised the different context in Australia. A range of topics were identified as worthy of further investigation based on lessons learned overseas:

- National values and how they will be harmonised.
- Standardising RBC-RBC interfaces.
- Ensuring local technical capabilities are developed alongside the standards.
- Defining a national framework, as closely aligned with the EU's framework as possible.
- Establishing a national coordination body (like ERA).
- Including appropriate cyber security requirements in the standards.
- Not precluding the future use of STMs where these can add benefit, e.g. for NNI trains that must also operate over a (non-NNI) section of track equipped with a system other than ETCS.
- Use of 'test benches' to ensure compliance with standards to minimise the need for site testing of DTCT onboard over every single trackside installation on the NNI. Note that the recommendation to use test benches was highlighted for networks where only a single supplier is engaged with a deployment.
- Minimising the frequency of updates made.
- Harmonising risk assessment approaches for ETCS business cases.

Many of the above items have been considered in the analysis contained in the Discussion Paper, and feedback, addressed below. Other items, for example, the need to develop local technical capabilities, are important but will not affect the core content of the proposed new mandatory standards.

2.2 Technical Requirements for Interoperability

Across all questions, stakeholders were aligned on the critical importance to avoid implementing anything that would cause a departure from the TSIs. They highlighted that a departure could lead to an Australia-specific solution that would not be on the product roadmap and have significantly higher ongoing costs and reduced functionality over the long term.

Noting this, stakeholders provided the following general feedback on the approach proposed in the paper:

Table 2. Summary of feedback: Technical Requirements

Summary of feedback	Response and actions	Scope Treatment
Consider broadening the application to potentially include key management, TMS, and interfaces including RBC-RBC, TMS-RBC/IXL, etc. interface, (without departing from the TSIs).	The intention is for mandatory Tier 1 standards to set out the items required for interoperability across the NNI, rather than other items aimed at more general alignment which, whilst potentially of value, are not necessary for interoperability. This includes items such as interfaces between ETCS and TMS, and between RBC and IXL – which may be better addressed at Tiers 2 or 3. As noted above, it is also seen as beneficial to maintain alignment of the definition of DTCT with elements specified in the ERA's CCS TSI. Key management and RBC-RBC interface are already included in the CCS TSI and are intended to be included in the DTCT Standards.	DTCT definition retained for Tier1 standards. Out of scope for mandatory standards: TMS functions, TMS-IXL and TMS-RBC interfaces, noting these items may be candidates for Tier 2 standards.
We should not constrain innovation and future developments (e.g. by restricting the use of STMs, although the standard should not mandate the existing Europe-specific ones that are not applicable in Australia).	Agree, the standards should not constrain innovation and future developments, noting the intention, through the mandatory standard, to maintain alignment across the NNI to an interoperable application of ETCS. The reference to STMs in the Interoperability Requirements Assessment was related specifically to not mandating the provision of the current Europe-specific STMs. Future developments that provide benefit for ETCS deployments in Australia must not be impeded and must be encouraged.	In scope for Tier 1 standards.
A variety of views on how to deal with the ETCS DMI – some stakeholders argue for retention of the ETCS DMI, others argue that it is not fit-for-purpose for the Australian freight network and operations and a bespoke/customised DMI should be allowed.	As noted in the Interoperability Requirements Assessment, a specific concern is that the DMI is integral to the ETCS specifications and so departing from this requirement could have unintended negative outcomes. It is proposed that the mandatory standard for onboard DTCT system requires compliance with the ETCS TSIs, which, by default, would mandate the use of the ETCS DMI. Any deviation that is desired may then be addressed through the governance process implemented. This would permit an RSO that sought to customise the DMI, or use another DMI, to demonstrate that the specific proposal did not impact on interoperability. The NTC intends to engage specifically on this issue with freight RSOs to understand any concerns in more detail.	In scope for Tier 1 standards.

Summary of feedback	Response and actions	Scope Treatment
Radio: A variety of views on how to deal with mission-critical voice communications (whether to be included in this standard or another closely linked standard), spectrum, adoption of FRMCS (some say this may not be suitable for all RIMs and other options should be allowed), NTCS (which may not necessarily comply with ETCS requirements) and possibly some enforceable minimum radio requirements which are backward-compatible to legacy radio systems.	A key reason for the proposal to align on the use of FRMCS relates to the capability of this system to function over different radio backbones. It is envisaged that FRMCS will provide a single onboard architecture that can be made to work over a range of different networks, including dedicated 4G/5G (and beyond) radio networks, legacy GSM-R networks, NTCS and comparable MNO-based networks, satellite and other networks. However, it is noted that this approach remains to be demonstrated. The approach to mission-critical voice communication systems is discussed further in Section 3.	In scope for Tier 1 standards.
Harmonisation of operational principles (and rules and existing standards): Generally supported in theory but acknowledged would be difficult in practice due to legacy practices across RIMs. ETCS provides once-in-a-generation opportunity to reduce the risk of confusion once implemented.	Future work will include evaluating the extent to which alignment (or harmonisation) of operating principles and rules can be achieved without unnecessarily constraining options for RIMs in configuring their ETCS deployments and aligning their rules with their wider networks. This issue is discussed further in Section 3.	Interdependencies between Tier 1 and Tier 2 requirements to be determined.
Cyber Security: This appeared to be a critical and missing consideration, with required cyber security level targets possibly beyond those specified in the TSIs, which is leading to RIMs developing bespoke solutions that are likely to impact interoperability.	The importance of cyber security to interoperability more broadly will be incorporated into development of mandatory standards. It will be important that the approach to cyber security taken in DTCT installations is aligned nationally, as this will be essential to the validity of each entity’s DTCT assurance argument. This issue is discussed further in Section 3.	Tier 1 requirements to be explored further.

Summary of feedback	Response and actions	Scope Treatment
Departures from the TSIs: Every railway that has implemented ETCS to date has deviated from the TSIs, and there is a critical need to carefully manage and coordinate these past deviations and any proposals for future deviations; some examples identified include: • In QLD, the alphanumeric train number entry (with encoding and decoding to format in DMI and Train Control), suppression of other train safety systems (vigilance, AWS, station protection) in supervised modes, use of packet 44 for some specific features, e.g. fire alarm reporting in tunnel or step-gap management. • In NSW, train data entry for brake degradation and train length, distance scale is set for metropolitan environment, some text messages are supplier specific, Balise Antenna position.	This issue will need to be carefully worked through, with a focus on ensuring seamless interoperability across the NNI whilst not imposing unnecessary costs on industry or governments, including paying particular attention to ensuring that the standards do not unintentionally lead to re-work being required on past or in-flight project implementations. The proposed approach is: 1. Engage with RIMs during development of the standards to identify in detail the deviation they have already implemented on their DTCT Trackside assets (ETCS Level 2 and Level 1). 2. Identify which of these deviations would require DTCT Onboard to implement a matching deviation in the future. 3. Engage with RSOs during development of the standards to identify in detail the deviation they have already implemented on their on their existing or planned DTCT Onboard assets. 4. Agree on the deviations to be mandated (or not) on DTCT Onboard standard to support Interoperability on the NNI. 5. Agree on a framework for RIMs and RSOs to manage other deviations so that they do not jeopardise interoperability on the NNI. 6. Consolidate list of functions candidate for Tier 2 standards.	In scope for Tier 1 standards.
RSOs note the standard looks to provide flexibility for RIMs and constrain RSOs, who shoulder the burden of restrictive standards to work around.	NTC's intent is to mandate only those requirements that are necessary for interoperability whilst permitting flexibility in other areas. The approach taken in Europe to achieve interoperability, and reflected in the CCS TSI, emphasises the need for onboard ETCS standardisation, while offering a greater configurability to the trackside subsystem. The NTC intends to engage specifically on this issue with freight RSOs to understand any concerns in more detail.	In scope for Tier 1 standards.

2.3 Applicability

The NTC requested feedback in relation to whether the mandatory standard should apply to all vehicles that operate over any part of the NNI, or whether vehicles that are contained to a single network that is, a network managed by a single RIM) need not comply fully with all NNI interoperability requirements (noting they would clearly need to comply with any requirements set by that RIM). The NTC also requested feedback on whether the mandatory standard should apply to an entire network that includes part of the NNI, or only to those specific tracks that form part of the NNI.

2.3.1 Rolling stock

Stakeholders (with the exception of suppliers) indicated a preference that rolling stock that is contained to a single network (even if on the NNI) should be able to depart from the TSIs and/or use non-standard ETCS parameters, but only so long as:

- There is a mechanism for documenting, justifying, and governing the fleets that will never leave their jurisdiction and associated deviations, and

- The deviations on these fleets do not impact or create the need for any additional functionality for trains compliant to the NNI standards that will travel on those same parts of the NNI as these non-compliant fleets.

This will be explored further through the impact assessment process.

2.3.2 Networks

Stakeholders generally agree that the standard should apply for the tracks that are on the NNI (and those supporting their entry and exit) rather than for the entire network for each network that has even a small area on the NNI, noting:

- Considerations to be given for the territories that vehicles may need to travel on if diverted from the NNI, and

- The implications for the remainder of these networks if only part of them must comply with this standard.

2.4 Managing Interoperability During Delivery

Stakeholders, in general, agree with the proposals provided in the paper, with the following discussion points. All these items will be considered in detail and in consultation with stakeholders, as the Tier 1 standards are drafted and the detail of the assessment and assurance process is developed – noting that the issues raised will require to be addressed both in the Tier 1 standards and in the governance arrangements that are adopted surrounding DTCT interoperability.

Table 3. Summary of feedback: Managing Interoperability During Delivery

Summary of feedback	Response and actions	Scope Treatment
Stakeholders universally agree with the proposed approach of utilising independent assessors to demonstrate compliance, provided the approach is nationally coordinated, scalable, and cost-effective. Stakeholders refer to the benefits of the European model that provide consistency and remove duplication, but caution against creating a complex and burdensome process that can create cost and time implications.	As the Tier 1 standards are drafted and the detail of the assessment and assurance process is developed, it will be necessary to investigate in further detail the independent assessment approach in place in Europe and the underlying standards, in particular any of the changes made and lessons learned that have been or should be implemented to reduce red tape and improve efficiencies.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders generally agree that a systems approach is appropriate, and that demonstration of compliance at the subsystem level should improve efficiency and avoid duplicating effort. Some stakeholders suggest that a process for resolving any conflicts between TSI and DTCT-specific requirements would be required.	To be considered in detail as the Tier 1 standards are drafted.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders point to several frameworks for maximising cross-acceptance for DTCT compliance, including the existing type-approval process (which is undergoing a national approach), the Rail Industry Worker program, ERA's IC certification, and the potential use of a national integration laboratory.	NTC will investigate the provided references to existing frameworks, particularly the status and plan for the National Product Type Approval framework, to determine the elements which are most effective and how these processes can be re-used or adapted for DTCT.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders generally consider that independent compliance should be necessary for a RIM's first projects, but also any subsequent projects that implement a change to DTCT principles, new interfaces, or introduce any deviations; with RIMs noting the need to avoid unnecessary red tape for standard deployment of an already-compliant system.	Based on the feedback, it seems appropriate to take a risk-based approach to compliance and certification, recognising that some systems, networks and deployments will present greater complexity than others. For example, the first project will deserve greater scrutiny than the 10^{th} (using the same configuration and parameters), but equally a completely novel implementation on a complex area will deserve greater scrutiny than a slight change in a less complex area.	To be addressed in Tier 1 standards and in governance arrangements.

Summary of feedback	Response and actions	Scope Treatment
Stakeholders universally agree that the Australian ESC/RSC identified by the RIM be published and coordinated nationally, and that the review of the Trackside DTCT Interoperability Assurance Report be coordinated nationally.	Tier 1 standards drafting process to consider how to mandate and manage the publishing and national coordination of ESC/RSC identified by the RIM, and nationally coordination of the review of the Trackside DTCT Interoperability Assurance Report.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders generally agree with the overall interoperability assurance approach proposed, noting the need to focus on interfaces and integration governance to reduce duplication, without centralising operational decision-making or restricting the accountability of RIMs to make decisions on their own networks.	To be developed and explored in the next stages of work and in consultation with stakeholders. This will also require detailed discussions with ONRSR noting the Australian regulatory environment.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders generally agree with testing and certification against technical and operational requirements of the Onboard DTCT standard like what is being done by Notified Bodies (NoBos) in Europe, noting the need to ensure it provides a significant reduction in on-track testing and certification activities, and having the relevant legal frameworks in place.	NTC will develop the requirements around testing and certification in consultation with stakeholders. The appropriate starting point would appear to be a process and requirement similar to what is being done via the use of NoBos in Europe, noting that this will have to be developed and explored in the context of the Australian industry. This will also require detailed discussions with ONRSR noting the Australian regulatory environment.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders universally support the standard requiring the use of an Independent Safety Assessor and compliance to CENELEC RAM and Safety standards, noting the importance of consistency in the content and structure of these documents to reduce costs and time for cross-acceptance, confirming a common understanding of the ISA term across contexts, including a reference to cyber security threats, and reviewing the CENELEC to determine if any adaptions may be needed to suit the Australian context.	The application of these standards in the Australian context will be worked through as NTC proceeds to draft the Tier 1 standards, noting also that this issue will also form part of the governance arrangements surrounding interoperability. As previously noted, maintaining alignment (where appropriate) with requirements from Europe (eg CENELEC standards) is expected to be beneficial over the long term.	To be addressed in Tier 1 standards and in governance arrangements.
Stakeholders generally agree with an independent entity to review and endorse the reports, with several options provided including a new dedicated body or use of existing bodies (such as RISSB, NTC, etc.)	Options to be developed and explored with stakeholders as the governance arrangements for interoperability are considered.	Out of scope for Tier 1 standards -- to be addressed in governance arrangements.

2.5 Ongoing Interoperability Management

Throughout the responses, a common theme echoed by all stakeholders is that very clear governance will be critical to the success of interoperability. As such, there would likely be a need for a national coordinating entity (perhaps similar to ERA) that would be responsible for managing the application of the standards.

In August 2025 Infrastructure and Transport Ministers agreed to a new, strengthened RISSB as the industry-led technical standard body for rail standards development in Australia. This decision will ensure a national strategic focus is applied to the development, assessment, assurance and adoption of national rail standards to support greater consistency across rail technology, rolling stock, infrastructure, skills and training.

The NTC, through the National Rail Action Plan, will continue to explore governance arrangements in further detail, including through the Rail Safety National Law Consultation - Regulatory Impact Statement due for public consultation in early 2026.

Table 4. Summary of feedback: Ongoing Interoperability Management

Summary of feedback	Response and actions	Scope Treatment
Stakeholders generally support a permanent coordination body (like a simplified version of ERA) to manage standards, updates, cross-acceptance, and governance	Options to be developed and explored in further detail as the governance arrangements for interoperability are progressed.	To be progressed as part of governance arrangements.
Stakeholders universally support the need for national coordination and management of ongoing interoperability issues, noting the need to seek long-term stability of ETCS specifications and to avoid rushing ahead of EU innovations, to coordinate deployment plans across RIMs and RSOs, and a potential legislated mechanism to ensure recognition of nationally coordinated functions.	Options to be developed and explored in further detail as the governance arrangements for interoperability are progressed.	To be progressed as part of governance arrangements.

Summary of feedback	Response and actions	Scope Treatment
Stakeholders agree with the proposed allocation of accountability to manage interoperability (Section 8 of the requirements assessment), adding the following for consideration: • Radio & trackside subsystems for ETCS Level 1 (FS) / arguments for the viability of the use of the NTCS. • Continual improvement incorporating industry consultation. • Concepts of Operations and Maintenance. • Nationally coordinated testing and training centre. • National rolling stock fitment and trackside rollout strategy. • Retrospective certification & approval of ETCS products in service. • Traffic Management Systems (upgrade/replacement to support ETCS L2, clarity of interoperability requirements, enabling safety functionalities). • Fringe signal arrangements at RIM boundaries. • Radio spectrum and mission critical voice comms. • Cyber security risk management and levels and controls.	Table 11 in the Interoperability Requirements Assessment provides a good starting point for the allocation of accountabilities, but it is recognised that appropriate allocation may change as the Tier 1 standards are developed and as agreed governance arrangements emerge. The allocation of accountability for the additional items identified in the summary of feedback will be considered as this process proceeds, noting that: • Some items are already addressed in Table 11, e.g. “Coordinate ETCS deployment plans” (from Table 11) would include the national rolling stock fitment and trackside rollout strategy. • Some items listed may more appropriately be addressed at Tier 2, rather than Tier 1, e.g. Concepts of Operations and Maintenance, Traffic Management Systems, Fringe signal arrangements at RIM boundaries. • The identification of several items as issues to be addressed, including mission critical voice communications and cyber security, aligns with other feedback in this report.	To be progressed as part of Tier 1, Tier 2 and governance respectively (including interdependencies).

3 Specific issues for consideration

3.1 Cyber Security

An aligned approach for cyber security has been identified in the feedback as a critical area for consideration as national alignment on DTCT and interoperability is pursued, and as Tier 1 DTCT standards are developed. The NTC recognises that this is an important topic to be addressed.

With respect to DTCT interoperability, the focus must be on what is required onboard so that RIMs can mitigate their cyber security risks to a level that is acceptable, and vice versa. This is like the approach taken in the CCS TSI where Safety Integrity Levels have been mandated for the onboard functions so that the network hazards mitigated by such functions are reduced to a residual risk level acceptable to (and understood by) all RIMs.

Details will be considered further in the next stages of work and in engagement with stakeholders (and in parallel with developing the first draft of the DTCT Tier 1 standards). The requirements of Australian Standard 7770 2018 and latest Code of Practice will need to be considered (and maybe updated), with some elements mandated to support DTCT deployments. At this stage it is unclear whether the appropriate way forward is:

1. Incorporate requirements directly into the DTCT Tier 1 standards, or
2. Develop a separate mandatory standard addressing cyber security, which is then referenced by the DTCT Tier 1 standards, or
3. Identify mandatory DTCT-related cyber security requirements in the Tier 1 standard, but develop a Tier 2 standard that includes non-mandatory (but arguably 'best practice') requirements, or
4. Another approach.

It is noted that the Tier 1 standards are focussed on achieving interoperability, and so the elements that will be mandated are those that allow for interoperability only.

As with all mandatory requirements that may be included in the Tier 1 standards, it will also be necessary to consider any existing local requirements of the various rail jurisdictions and how a national standard would interface.

With respect to cyber security issues and ETCS, a critical principle is alignment of Australian requirements with requirements in Europe, with the state of industry and product availability, and to not mandate cyber security requirements that are over and above those in other applications of ETCS. To do so would expose our local industry to excessive costs and development risks that are not aligned with the overall intention for Australia to align with the international pathway using ETCS.

3.2 Radio systems (including mission-critical voice communications)

Feedback identified that alignment on mission-critical voice communications as a key issue for effective and efficient movement of trains across the NNI. This is clearly the case. As has been noted previously in this report, the definition of DTCT presented in the Interoperability Requirements Assessment is implicitly derived from the remit currently agreed by ITMM for the Tier 1 mandatory standards. The feedback provided will assist NTC to demonstrate why this remit should be expanded. As noted, including this in a mandatory standard would also align with the scope of European CCS TSI and may provide greater standardisation of the approach to be used in Australia.

The Interoperability Requirements Assessment presented a migration to the FRMCS onboard architecture to accommodate different radio systems across the national network, including different generations (2G/4G/5G) and a mix of rail-specific, MNO and satellite options, and to allow transition between technologies.

The FRMCS framework will also assist to align mission-critical voice communications and other critical items. Further analysis and industry engagement will be required to confirm aspects of the voice functions to be standardised, particularly for Australian specific requirements and considering the migration from existing technologies (e.g. ICE, etc.).

Like the discussion on cyber security, at this stage it is unclear whether the appropriate way forward is to incorporate requirements for mission-critical voice communications directly into the DTCT Tier 1 standards, or to develop a separate standard addressing these requirements.

NTC will progress this analysis in parallel with developing the first draft of the DTCT Tier 1 standards, permitting decisions to be made at an appropriate stage on the best approach to ensure alignment on mission-critical voice communications systems across the NNI.

3.3 Harmonisation of signalling and operating principles

Feedback received demonstrates a willingness to pursue national alignment on operating agreements and engineering principles used with ETCS deployments on the NNI. It remains the NTC's view that these elements are (in general) best addressed as Tier 2 standards to drive efficiency and productivity, rather than Tier 1 mandatory issues to ensure interoperability. However, as specific issues are explored it may be the case that some specific elements must be aligned.

The next stages of this work includes further development of the issues canvassed in the Interoperability Requirements Assessment, potentially leading to the development of a small number of generic operating and network configurations and a typical ETCS solution. This work will be led by ARTC, with support from the NTC.

Items to be considered in a Tier 1 standard are:

1. Core operational principles which could be mandated on the NNI. For example, different railway contexts in which ETCS modes are used, consistent messaging, signage, etc.
2. Core principles can be applied for foreseeable non-urban applications.
3. Alignment of train crew responsibility for these core operational principles.
4. Areas where alignment with Operation and Traffic Management (OPE) TSI is beneficial.
5. Areas where alignment with Australian Network Rules and Procedures (ANRP) and /or update of the ANRP is beneficial.

As with other elements of this work, NTC will seek to mandate only those requirements that are necessary for interoperability, whilst permitting flexibility in other areas. In this respect, future work will include evaluating the extent to which alignment (or harmonisation) of operating principles and rules can be achieved without unnecessarily constraining options for RIMs in configuring their ETCS deployments and aligning their rules with their wider networks.

3.4 Link to NRAP Streamlining Rolling Stock Approvals Workstream

The discussion presented in the Interoperability Requirements Assessment, and the feedback received, highlighted the need to ensure alignment between any consideration of assurance and acceptance processes and requirements for DTCT, and the wider issue of streamlining rolling stock approvals – which is the subject of a parallel workstream in the National Rail Action Plan.

As work progresses on both workstreams, the NTC will ensure alignment for an optimum outcome.

Appendix: Organisations represented at industry briefing sessions

Table 5. Organisations represented at industry briefing sessions

Alstom
Arc Infrastructure
Arcadi
Australian Rail Track Corporation
Aurecon
Aurizon
Base2
CAF
Certifier
CPB Contractors
Department of Transport & Planning VIC
Department of Transport and Main Roads
Department of Transport WA
Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts
Gear Rail
Hitachi
Innova Communications Australasia
Jacobs
JMDR
Knorr Bremse
Lamdaflux
Mermec
MPH Consulting
Network Rail Consulting
Nokia
Office of National Rail Industry Coordination (ONRIC)
Pacific National
Qube
Queensland Rail
Redding Consulting
Ricardo Rail
Siemens
Sigtech Solutions
Suburban Rail Loop Authority
TasRail
The Signalling Company

Transport for New South Wales
Sydney Trains
UGL
UGL Regional Linx
Victorian Infrastructure Delivery Authority
Wabtec
WiPowerOne
WSP

National Transport Commission

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