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SYSTEM/PROJECT/PRODUCT: Traffic Controllers

Siemens ST950 & ST900  
Statement of Compliance Against  
TR 2513 Issue A, September 2005  
“Performance Specification for  
Wig Wag Signal Control Equipment”

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THIS DOCUMENT IS ELECTRONICALLY HELD AND APPROVED

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# 1. Introduction

## 1.1 Purpose

This document is the Statement of Compliance for the Siemens ST950 and ST900 families of Traffic Controllers on the Highways Agency “Performance Specification for Wig Wag Signal Control Equipment” numbered TR2513.

Our comments are marked as follows:

Noted:	The clause has been noted but it contains no requirements to which we need to state our controllers’ compliance.
Compliant:	A requirement clause against which our controllers are compliant against the specification as written.
Clarification:	A requirement clause to which our controllers are functionally compliant, but additional information on our implementation is provided. Alternatively, these may be instances where our products satisfy what we believe to be the requirement in a different manor than described in the text.
Query: (if used)	Requirements that we believe are either in error or are ambiguous and were we have provided our recommendations for change.

## 1.2 Scope

This document covers the requirement document TR2513A Highways Agency Specification. It details the Statement of Compliance for **new products** released as part of the Siemens Traffic Controls family of Controllers. We note that retrospective action is not required by TR2513A and therefore existing products are not covered by this document.

## 1.3 Referenced Documents

- 1.3a) 667/BB/32900/901 –  
Siemens ST950, ST900 & ST750 Statement of Compliance Against TR 2500 (currently at issue 7)

## 1.4 Issue History

This document is used as part of the Siemens Self Certification of the ST900 Family of Controllers.

- Draft A – Initial draft for comment
- Draft B – Includes tracked changes made during the review with Dave Martin (28/05/09)
- Draft C – Includes comments from Keith Manston (Product Manager) and resultant changes (tracked).
- Issue 1 – Released covering ST900
- Issue 2 – Updated to incorporate ST950 and cover the update from HD638 to EN50556

## **2. General Queries**

*This section refers to queries and clarifications on areas in TR2500 (the base traffic controller specification), that cover several associated requirements from one or more of the specifications applicable to traffic products.*

### **Refer to 667/BB/32900/901**

*For full details, please refer to this section in our document 667/BB/32900/901 (ref 1.3a).*

### 3. Compliance against TR2513A

This section contains compliance comments for the ST950 & ST900 against the clauses in TR2513A “Performance Specification for Wig Wag Signal Control Equipment”...

TR2513A Clauses	Compliance
<p><b>1 INTRODUCTION</b></p>	
<p>1.1 This performance specification covers the essential requirements for vehicle and cattle crossing control equipment as defined in The Traffic Signs Regulations and General Directions.</p>	Noted
<p>1.2 This specification supersedes specifications MCE 0113B, MCE 0109B, MCE 0148A and MCH 1502A and the approval process described therein.</p>	Noted
<p>1.3 As a statutory requirement equipment manufactured according to this specification must be approved before its use is permitted on the public highway.</p>	Noted
<p>1.4 Statutory Approval (Approval) shall be in accordance with the requirements for Self-Certification set out in TRG 0600.</p>	Noted
<p>1.5 Within this specification, “The Product” shall mean all components necessary to provide a complete operational system meeting the requirements of this specification and the Common Requirements defined in TRG 0600.</p>	Noted
<p>1.6 Guidance to potential users of a Product approved to this specification is given in Appendix F.</p>	Noted
<p><b>Implementation</b></p>	
<p>1.7 This specification will be immediately implemented from the date of issue for all new approvals.</p>	Noted
<p>1.8 Equipment Approvals for this product issued under the previous procedures defined in TRG 0500 will remain valid and no retrospective action will be required providing the build state of that equipment remains unmodified.</p>	Noted
<p><b>Glossary of Terms</b></p>	
<p>1.9 A comprehensive glossary of terms is given in Highways Agency document TA 84 Code of Practice for Traffic Control and Information Systems for All-purpose Roads.</p>	Noted

TR2513A Clauses	Compliance
<p><b>2 FUNCTIONAL REQUIREMENTS</b></p>	
<p><b>General</b></p>	
<p>2.1 The Products defined in this specification are used to control vehicles at roads on approaches to, or in the vicinity of the following:</p> <ul style="list-style-type: none"> <li>• emergency service stations;</li> <li>• airfields;</li> <li>• moveable bridges, and tunnels;</li> <li>• cattle crossings;</li> <li>• railway crossings.</li> </ul>	<p>Noted</p>
<p>2.2 The traffic signals at these locations are normally off and operated locally or remotely by an operative, as and when necessary.</p>	<p>Noted</p>
<p>2.3 The Product consists of a controller, vehicle traffic signals, control panels and mimic signals for the operator.</p>	<p>Clarification Siemens provides a Controller and Signals that meet this specification, including the interfaces to Control Panels and Mimic Signals. However, Panels and Interfaces change on a contract by contract basis and will be defined in the Work Spec. Consequently, where requirements refer to these features, our indication of compliance represents the ability of the controller to provide the required interface and panel if required.</p>
<p>2.4 For Vehicle crossings, the signals shall be in accordance with TSRGD Diagram 3014.</p>	<p>Compliant</p>
<p>2.5 For Cattle crossings, the signals shall be in accordance with TSRGD Diagram 4005.</p>	<p>Compliant</p>
<p>2.6 The control of the signals shall be as defined in the appropriate application appendix of this specification.</p>	<p>Noted</p>
<p>2.7 The signal shall function in one the following three operation modes:</p> <ul style="list-style-type: none"> <li>• Signals off;</li> <li>• Signals on; (Local activation)</li> <li>• Signal controlled from a remote source.</li> </ul>	<p>Compliant</p>
<p><b>Performance</b></p> <p>2.8 The requirements of signal intensity for safety of BS 7987 shall be complied with. For signals this is class AF1; for the controller driving the signals this is class AF5.</p>	<p>Clarification Class AF5 is covered within the Statement of Conformity to TR2500A: refer to document 667/BB/32900/901 (ref 1.3a).</p>

TR2513A Clauses	Compliance
2.9 For Signals with red flashing aspects the displayed signal sequence shall comply with TSRGD Regulation 39. The duration of the amber periods preceding the flashing red signals shall be of a fixed 5-second duration.	Compliant
2.10 For signals with amber flashing aspects the displayed signal sequence shall comply with TSRGD Regulation 51.	Compliant
2.11 The light on time shall be between 45% and 55% of the flash cycle time.	Compliant
2.12 All timed periods shall be accurate to within $\pm 5\%$ . This accuracy shall be maintained throughout the life of the equipment without subsequent adjustment.	Compliant
<b>Fault detection and reporting</b>	
2.13 The Product shall include the functionality to monitor the operational status of the signals such that faults can be detected and reported.	Compliant
2.14 If one signal aspect fails, a condition shall be displayed on the control panel.	Clarification The standard digital outputs "LF" and "RF1" (TR2523A) can be provided by the controller. These are open-circuit while the fault is present. The fault will be automatically cleared and the output returned to its normal state when the aspect appears to be working. An interface for parallel I/O compliant to TR2523A will be provided as standard. Other types may be provided for on a Work Spec basis as necessary to interface to other existing equipment.
2.15 In the event of two red aspects on a vehicle crossing failing, on a single approach, the procedure for fault category 1 shall be followed.	Compliant
<b>System Communication</b>	
2.16 Where the interconnection between the Product components is via cables then these shall be compliant with BS 6346.	Compliant
<b>Wireless Communications Integrity</b>	
2.17 Where the interface between the Product components are wireless then the following addition requirements shall apply...	Noted At this time Siemens does not supply a wireless Wig-Wag system. Siemens will certify wireless interfaces when and if provided by Siemens. If a customer provides the wireless interface we will direct them to this clause.

TR2513A Clauses	Compliance
<p><b>Crossing Controller</b></p>	
<p>2.18 The Product shall be shall be capable of operating a maximum of 6 signal sets in pairs.</p>	<p>Compliant Note that the phrase 'in pairs' limits each 'approach' (from clause 2.15) to two signal sets.</p>
<p>2.19 The Product shall include facilities to adjust and set all adjustable timing parameters by authorised personnel only.</p>	<p>Clarification User interface compliant to TR2500A Appendix K.</p>
<p>2.20 The flashing sequence of vehicle crossing signals on either side of a highway and facing in the same direction shall operate in synchronisation.</p>	<p>Clarification Note: Where two separate Wig-Wag Controllers are used, e.g. either side of a bridge, then no synchronisation is provided between those controllers.</p>
<p>2.21 A mimic display shall be provided to simulate the operational status of the roadside signals.</p>	<p>Clarification The controller can provide standard phase outputs (in addition to the outputs that drive the real Wig-Wag signals) or digital outputs (to TR2523) that can be used by a mimic display.</p>
<p><b>Construction</b></p>	
<p>2.22 The equipment housing shall be constructed in such a manner and from materials to meet the environmental requirements defined in TR 2130.</p>	<p>Compliant Existing controller cabinets used for the Siemens Wig Wag controller have been tested and proven to meet these requirements.</p>
<p><b>Degrees of protection provided by enclosures (IP Code)</b></p>	
<p>2.23 The Product housing shall be manufactured to BS EN 60529 IP 55.</p>	<p>Compliant Existing controller cabinets used for the Siemens Wig Wag controller have been tested and proven to meet these requirements.</p>
<p>2.24 The Product housing shall provide mechanical protection to IP XX9. Surface cracks may be allowed providing complete penetration does not occur i.e. no degradation to the IP protection of the equipment. No damage occurs to the equipment contained within the housing, and the equipment continues to operate to its specification.</p>	<p>Compliant Existing controller cabinets used for the Siemens Wig Wag controller have been tested and proven to meet these requirements. Signal Heads comply to EN 12368.</p>
<p><b>Reliability</b></p>	
<p>2.25 The Product shall be designed and constructed such that it can deliver a Mean Time Between Failures (MTBF) prediction figure of 12000 hours or greater, continuous operation.</p>	<p>Compliant</p>



TR2513A Clauses	Compliance
<p><b>Electrical Requirements</b></p>	
<p>2.26 The Product shall operate from one of the following electricity supplies:                      i) 230V ac +10% to -13% at 50 Hz ±4%;                      ii) 110V ac (55V-0V-55V) +10% to -13% at 50 Hz ±4%.</p>	<p>Compliant                      Siemens products operate from 230V.</p>
<p>2.27 In the event of a supply failure or interruption longer than 50 milliseconds the controller shall cause a category 2 fault.</p>	<p>Clarification                      The controller is compliant to Class E2 from HD 638 (BS 7987) and Class E3 from EN50556. It will continue to operate with an interruption of less than 50mS duration. It will typically detect an interruption of 80mS and extinguish the signals and optionally (see 2.35) keep them extinguished until manual reset. Refer to document 667/BB/32900/901 (ref 1.3a) for more details.</p>
<p>2.28 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.</p>	<p>Compliant</p>
<p><b>Failure Modes</b></p> <p><b>Category 1</b></p>	<p><i>For information only: Category 1 is triggered by the following:                      2.15) Two red failures</i></p>
<p>2.29 All signals shall be disconnected from the power source within 500 ms.</p>	<p>Compliant</p>
<p>2.30 A fault condition shall be displayed on the control panel.</p>	<p>Clarification                      The standard digital output “RF2” (TR2523A) can be provided by the controller. This is open-circuit while the fault is present.                      An interface for parallel I/O compliant to TR2523A will be provided as standard. Other types may be provided for on a Work Spec basis as necessary to interface to other existing equipment.</p>
<p>2.31 Operation of The Product shall be inhibited until the fault has been rectified and The Product manually reset.</p>	<p>Compliant</p>
<p><b>Category 2</b></p>	<p><i>For information only: Category 2 is triggered by the following:                      2.17) Failure of Wireless Communications                      2.27) Mains Supply Failure</i></p>
<p>2.32 All signals shall be disconnected from the power source within 500 ms.</p>	<p>Compliant</p>
<p>2.33 A fault condition shall be displayed on the control panel.</p>	<p>Clarification                      The standard digital output “LE” (TR2523A) can be provided by the controller that is closed-circuit while the controller is operating normally and open-circuit while the controller is powered down.                      An interface for parallel I/O compliant to TR2523A will be provided as standard. Other types may be provided for on a Work Spec basis as necessary to interface to other existing equipment.</p>

TR2513A Clauses		Compliance
2.34	Operation of the Product shall reinitialise in the signals off state when the power is restored.	Compliant
2.35	When a fault condition is cleared the indication on the control panel shall not be removed until it is cleared by an operator.	<p>Clarification</p> <p>We believe that this requirement only applies to failures of wireless communications and not to mains supply failures. Therefore by default, the fault output provided by the controller is automatically cleared once the controller is running normally again. If specifically requested in the Work Spec, the fault output provided by the controller and optionally the signals off state will remain latched until cleared by an operator.</p>

TR2513A Clauses	Compliance
<p><b>3</b>     <b><i>NORMATIVE REFERENCES</i></b></p>	
<p><b><i>British Standards</i></b></p>	
<p>BS 6346 – Electric cables. PVC insulated, armoured cables for voltages of 600/1000V and 1900/3300V</p>	<p>Noted</p>
<p>BS 7671 – Requirements for Electrical Installations</p>	<p>Noted</p>
<p>BS 7987 – Road Traffic Signal Systems</p>	<p>Refer to section 4 (and section 5 for EN12675 referenced by BS 7987).</p>
<p>BS EN 60529 – Specification for Degrees of Protection Provided by Enclosures (IP Code)</p>	<p>Noted</p>
<p><b><i>Specifications</i></b></p>	
<p>TR 2130 – Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment</p>	<p>Noted (also refers to BS 7987; see above)</p>
<p>TR 2523 – Traffic Control Systems Interfacing Specification</p>	<p>Refer to section 7.</p>
<p>TRG 0600 – Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment</p>	<p>Compliant</p>
<p><b><i>Other Publications</i></b></p>	
<p>TSRGD – Traffic Signs Regulations and General Directions</p>	<p>Compliant</p>
<p><b><i>Network Rail Publications</i></b></p>	
<p>GI/RT 7012 – Requirement for Level Crossings</p>	<p>At this time, this Siemens product is not intended for use at Railway Level Crossings; see our comments against Appendix E.</p>

TR2513A Clauses		Compliance
<b>Appendix A: Emergency Services Stations</b>		
A1	Products for use at emergency service stations shall provide the following additional features.	Noted
A2	Adjustable parameters for each signal shall be as follows: <ul style="list-style-type: none"> <li>• Delay from initiation to start of illumination (in the range 0 to 30 seconds).</li> <li>• Duration of illumination (in the range 30 to 300 seconds).</li> </ul>	Compliant
A3	A remote control and monitoring panel to indicate and enable the following features: <ul style="list-style-type: none"> <li>i) a mimic display of the road side signals with blue or white illuminated indicators to confirm to operation all road side signals;</li> <li>ii) establish the exit direction (for use in conjunction with dual carriageways);</li> <li>iii) activation of the appropriate signals;</li> <li>iv) display the operational status of all the roadside signals (Refer to A4);</li> <li>v) indicate a fault condition visibly;</li> <li>vi) indicate a fault condition audibly;</li> <li>vii) mute the audible alarm;</li> <li>viii) clear a fault condition or cancel an alarm.</li> </ul>	Refer to our comments against clause 2.3
		Clarification; refer to clause 2.21.
		Clarification We take this to mean switch on one approach if only one carriageway is affected by the vehicle exit or both if both carriageways are affected. It is expected that this will be requested in the Works Spec.
		Clarification (see above)
		Compliant
		Compliant
		Compliant
		Compliant
		Clarification; refer to clause 2.35.
A4	The display in A3(i) shall operate in synchronisation with each red vehicle crossing signals.	Compliant

TR2513A Clauses		Compliance
<b>Appendix B: Airfields</b>		
B1	Products for use adjacent to Air Fields shall provide the following additional features.	Noted
B2	The control of the signals shall be via a remote connection.	Clarification The controller for the signals would need to be within a few hundred metres of the signals. However, the control panel could be located remotely.
B3	The signals shall remain in operation until switched off.	Compliant
B4	A remotely sited control and monitoring panel that delivers the following functionality:	Refer to our comments against Clause 2.3
	i) A miniature display of the signals with blue lenses;	Clarification; refer to clause 2.21.
	ii) A means to activate and deactivate the signals;	Clarification Provided by TR2523A digital inputs and as required by the customer's Work Spec.
	iii) A means to indicate a fault condition visibly;	Compliant
	iv) A means to indicate a fault condition audibly;	Compliant
	v) A means to mute the audible alarm and clear a fault.	Compliant
	vi) A means to clear a fault condition.	Clarification; refer to clause 2.35.
B5	The miniature blue display shall operate in synchronisation with each red vehicle crossing signals.	Compliant

TR2513A Clauses	Compliance
<p><b>Appendix C: Moveable Bridges and Tunnels</b></p>	
<p>C1 The Product for use adjacent to moveable bridges is normally used in conjunction with lifting-barriers and shall provide the following additional features.</p>	<p>Noted</p>
<p>C2 Means to raise and lower barriers.</p>	<p>Clarification The equipment to raise and lower barriers is not supplied by Siemens. Siemens intend to provide TR2523A compliant I/O for use by suppliers of barriers.</p>
<p>C3 Interlocks that validate the positional and operational status of the barriers.</p>	<p>Clarification The Works Specification for the Controller from the Customer shall identify the interlock requirements using the interfaces defined in TR2523A. Interlocks and their exact operation may vary on a contract by contract basis and form part of the configurable options on a Works Spec basis.</p>
<p><b>Control and Monitoring Panel</b></p>	
<p>C4 A remote control and monitoring panel to indicate and enable the following:</p>	<p>Refer to our comments against Clause 2.3</p>
<p>i) Activation of the signals at either end of the bridge structure independently when interlocks are in normal mode.</p>	<p>Clarification We expect the exact operation to be defined in the Work Spec dependant on the customer's required method of working.</p>
<p>ii) Indication that the signals are in operation.</p>	<p>Compliant</p>
<p>iii) To raise and lower up to two barriers at either end of the bridge structure independently.</p>	<p>See our comments against clause C2 above.</p>
<p>iv) The barrier operation shall be manual at all times. If an operator removes pressure from the actuator then movement of the barrier must stop.</p>	<p>See our comments against clause C2 above.</p>
<p>v) To show the status of each, of up to four, barriers in each of the following states:</p> <ul style="list-style-type: none"> <li>• Raised;</li> <li>• Changing positions;</li> <li>• Lowered.</li> </ul>	<p>See our comments against clause C2 above. Where a Mimic Panel is supplied by Siemens it will be engineered together with the barrier supplier to provide this facility on a contract by contract basis if requested in the Works Specifications.</p>
<p>vi) To indicate that a barrier is changing position audibly.</p>	<p>The equipment to raise and lower barriers (including this Audible Signal) is not supplied by Siemens.</p>
<p>vii) Visible indication of a fault;</p>	<p>Compliant</p>
<p>viii) Audible indication of a fault;</p>	<p>Compliant</p>
<p>ix) To mute the audible alarm.</p>	<p>Compliant</p>
<p>x) To clear a fault condition.</p>	<p>Clarification; refer to clause 2.35.</p>

TR2513A Clauses	Compliance
<p><b>Pedestrian Audible Signal</b></p>	
<p>C5 An audible warning to pedestrians adjacent to the barrier shall be sounded when the barrier is changing positions up or down.</p>	<p>Our assumption is that this audible warning is generated by the equipment to raise and lower barriers, and this equipment is not supplied by Siemens.</p>
<p>C6 Audible warning signals shall be provided at each end of the bridge structure and should persist from the commencement of the vehicle-crossing signal until the barrier is in the fully lowered position.</p>	<p>See our comments against clause C5 above.</p>
<p>C7 The audible signal (Not the same as used at pedestrian crossings) shall be an appropriate constant Tone at 10 dBA above the ambient noise between the limits 50 dBA to 110 dBA measured at a distance of 1 metre of the sound source.</p>	<p>See our comments against clause C5 above.</p>
<p><b>Controller</b></p>	
<p>C8 A facility shall be provided such that the operation of the barrier is only allowed when the vehicle crossing signals are operating.</p>	<p>Clarification The Works Specification from the Customer shall identify these requirements using the interfaces defined in TR2523A and these may vary on a contract by contract basis and form part of the configurable options on a Works Spec basis.</p>
<p>C9 The Product shall provide an interlock to ensure that the offside barrier can only be operated when the nearside barrier is in the lowered position.</p>	<p>The equipment to raise and lower barriers is not supplied by Siemens.</p>
<p>C10 Means shall be provided to detect faults in the barrier movement mechanisms.</p>	<p>The equipment to raise and lower barriers is not supplied by Siemens.</p>
<p>C11 If the Controller detects a failure in the barrier detection circuit then the interlock output to the Bridge control system shall be inhibited.</p>	<p>Clarification The Works Specification for the Controller from the Customer shall identify the interlock requirements using the interfaces defined in TR2523A. However, if the barrier supplier is unable to provide a compliant output, others may be accepted subject contract specific configuration.</p>

TR2513A Clauses	Compliance
<p><b>Appendix D: Cattle Crossings</b></p>	
<p>D1 The Product used at Cattle crossing shall comprise a pair of signals to TSRGD Diagram 4005.</p> <p>The signals shall flash alternatively for a period of time determined by an operator through the operation of a secure control e.g. key switch.</p>	<p>Compliant</p> <hr/> <p>Clarification Where Siemens are required to supply this facility a secure control will be provided.</p>
<p>D2 The rate of the flashing amber signals shall be as specified in the TSRGD. The 'light on' time shall be between 45% end 55% of the flash cycle time.</p>	<p>Compliant</p>
<p>D3 Up to three remote control and monitoring panels that deliver the following functionality shall be provided:</p> <p>i) A means to activate the Signals using a key switch.</p>	<p>Refer to our comments against Clause 2.3</p> <hr/> <p>Compliant</p>
<p>ii) A means to validate the Signals operation visibly.</p>	<p>Compliant</p>
<p>iii) A means to indicate a fault condition visibly.</p>	<p>Compliant</p>
<p>iv) A means to clear a fault condition.</p>	<p>Clarification; refer to clause 2.35.</p>
<p>D4 The Controller shall include features to inhibit operation of the crossing signals after use, for a pre-set time period in the range 60 seconds to 300 seconds.</p>	<p>Compliant</p>
<p>D5 This inhibit period shall commence at the cessation of the preset flashing aspect period.</p>	<p>Compliant</p>



TR2513A Clauses	Compliance
<p><b>Appendix E: Railway Crossings</b></p>	
<p>E1 The control system and fault reporting features shall be as defined in Railway Group Standard GI/RT7012.</p>	<p>This product is not intended for use at Railway Crossings.</p>
<p>E2 Where additional signal are required to prohibit the passage of pedestrians, the signals and their mounting shall be in accordance with TSRGD Regulation 52 and Diagram 4006.</p>	<p>Noted</p>
<p><b>Appendix F: Informative Guide</b></p>	
<p><b>General</b></p>	
<p>F1 This Appendix is an informative guide to Highways Authorities who wish to purchase and use Wig Wag crossing Products that have been declared conformant to this specification. Prospective purchasers should ensure that the procurement contract address the following issue.</p>	<p>Noted</p>
<p><b>Marking and Labelling</b></p>	
<p>F2 Each assembly that comprises the Product must each be fitted with a label displaying the following:</p> <p>i) The unique Product identifier and serial number;</p>	<p>Compliant</p>
<p>ii) The application(s) for which it is approved;</p>	<p>Compliant</p>
<p>iii) The electrical supply requirements of the equipment.</p>	<p>Compliant</p>

#### **4. Compliance against BS7987 (HD638) and EN50556**

Note that HD638 S1 / BS7987:2001 has been superseded by EN50556:2011.

**Refer to 667/BB/32900/901**

Please refer to the BS7987/EN50556 section in our document 667/BB/32900/901 (ref 1.3a).

#### **5. Compliance against EN12675**

**Refer to 667/BB/32900/901**

Please refer to the EN12675 section in our document 667/BB/32900/901 (ref 1.3a).

#### **6. Compliance against TR2500**

**Refer to 667/BB/32900/901**

Please refer to our document 667/BB/32900/901 (ref 1.3a).

#### **7. Compliance against TR2523**

**Refer to 667/BB/32900/901**

Please refer to the TR2523 section in our document 667/BB/32900/901 (ref 1.3a).

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