

VoIP based Train Traffic Control Communication system - Field trial

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Synopsis:

RDSO has framed the scheme and specification of VoIP based train traffic Control communication system (TCCS). A work for field trial is also sanctioned in RDSO. The purpose of the field trial is to see the actual implementation of the various functional requirements and to get the feedback from the user. As per the requirement of the contract, the firm demonstrated the compliance of various functional requirements of TCCS in a lab set up in RDSO Lucknow. This article brings out the outcome of the demonstration. New possibilities also came out as a result of discussions held during demonstration. These possibilities are also mentioned in this article.

1. Introduction:

Specification of VoIP based Train traffic control communication system (TCCS) have been finalized by RDSO. The specification contains the scheme of the system and functional and technical requirements of the system and its various components. Since this system is for vital communication for train operation, field trial was considered necessary to evaluate the system and to take the feedback of the user. Therefore a work for field trial of VoIP based TCCS has been sanctioned in RDSO. The field trial would be done in a small section of 12 stations. The section is Mau- Shahganj traffic control section in Varanasi Division. The contract for this field trial of VoIP based train control communication as per RDSO/SPN/TC/99/2012 Rev. 1 to has been awarded to M/s Bitcom. The scope of the contract includes supply of data networking equipments also, in addition to VoIP based TCCS components, for setting up the network. As per the requirement of the contract, the firm demonstrated various features of the proposed solution in a lab setup

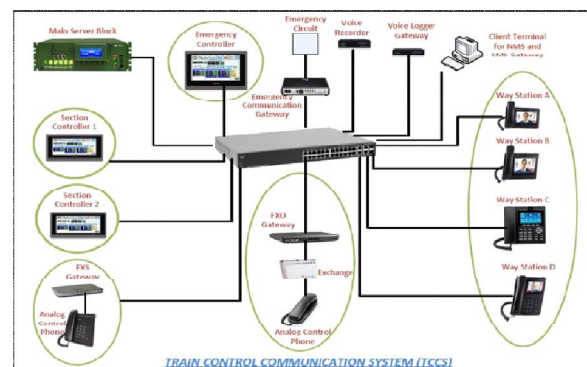
in RDSO. The details of the demonstration are given in this write up.

2. Set up for demonstration:

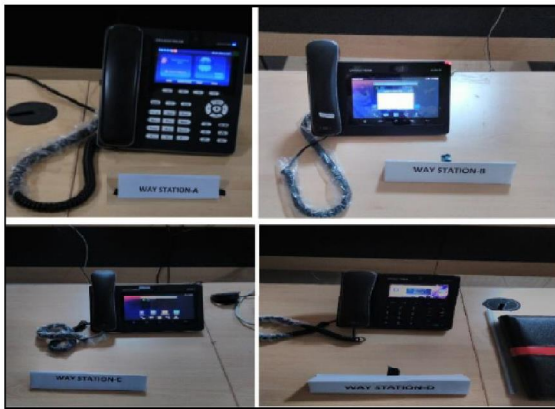
The set up consisted of following

- Section controllers- Two numbers. For trial, one of the controller's equipment was implemented on lap top.
- Emergency controller- Implemented on lap top.
- Way stations - 4 Numbers (station A, B, C, D): SIP telephones were provided for each way station.
- Voice logger as per existing RDSO specification with gateway to enable recording in the existing voice logger.
- New voice logger as per specification of VoIP based TCCS.
- Gateway for emergency control
- Communication server
- FXS gateway
- FXO gateway

- The schematic of the setup is given in the diagram below.



- Photo graphs of various components are shown below.



Way stations



SC 1 (Section controller 1)

SC 2 (Section controller 2)

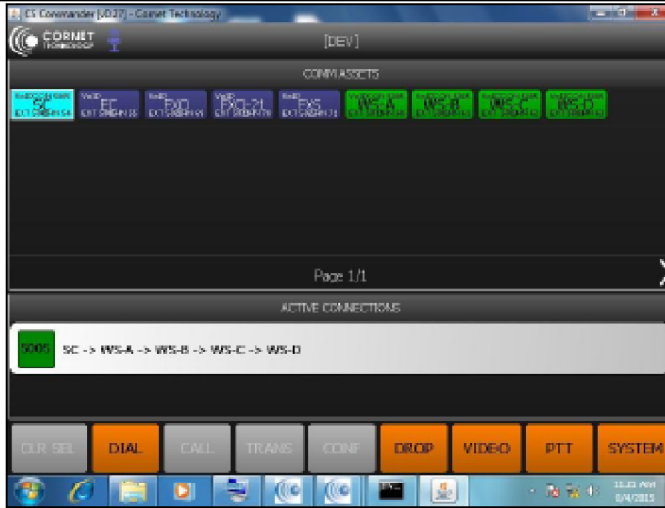




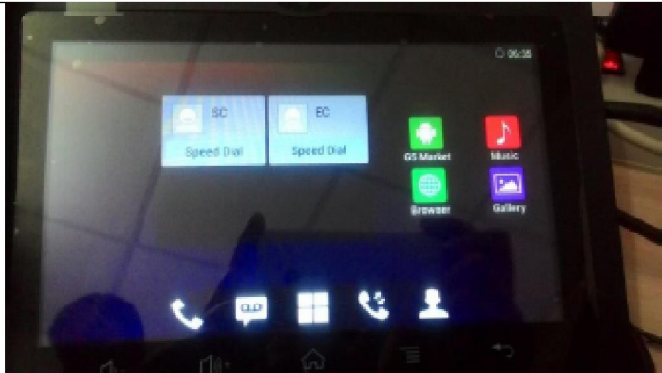
Communication Server


Gateway for existing Voice logger

3. Demonstration of various features of control communication

Screenshot	Feature
	<p>This screenshot depicts Section controller (SC) is in conference with way station A (WS-A) and B (WS-B). This is a typical scenario of control working wherein section controller call station A and then without disconnecting the call with A, it calls station B also.</p> <p>Controller can add more way stations to the ongoing conference call by dialing their numbers or by touching name of stations on the console.</p> <p>On the top row, names of various stations and controllers are shown. By touching these names, these stations can be dialed.</p> <p>The back ground color has changed to green for WS-A and WS-B which are dialed.</p>

Screenshot	Feature
	<p>When-ever a way station makes a call to the controller; he gets added to the ongoing conference. For example, if station C dials the controller's number, he will not get busy tone. Instead he will be added to the ongoing conference between controller and way stations.</p> <p>Here SC is in conference with stations A, B, C and D. SC initially dialed station A, B. Afterwards stations C and D called SC and got added to the conference.</p>
 <p style="text-align: center;">Group Call By SC-1</p>	<p>Group call feature.</p> <p>SC makes a group call by touching G1 on the console. The back ground of G1 turn green and the per-defined group members A, B, C and D are connected to SC1 conference.</p>
	<p>The section Controller (SC1) calls other controllers (SC2) from his console and add them to ongoing conference call.</p> <p>SC-1 in conference with SC-2 and way stations</p>

Screenshot	Feature
 <p>Soft Key for SC(Section Controller) and EC(Emergency Controller)</p>	<p>Way station control telephone can call the controller by a touch of button or by dialing a code.</p>
 <p>The voice recorder screen shot</p>	<p>It records conference conversations of various controllers. It is also possible to record direct way station to way station conversation not involving controller.</p>
 <p>Voice Logger Gateway</p>	<p>Recording of the conversations of various controllers in the existing analog multi-channel voice logger as per RDSO specification RDSO/SPN/TC/38-02 was also demonstrated through voice logger gateway.</p>
 <p>Emergency Gateway</p>	<p>Emergency Control Circuit: A gateway for interfacing IP network and the emergency control circuit was demonstrated to reach the control office by plugging a 4 wire portable control telephone into any of the sockets. The gateways can be provided either at every way station or only at HQ depending upon the availability of connectivity from way station to HQ.</p>

Screenshot	Feature
 <p>SC-1 in Conference with Emergency gateway</p>	Emergency call received on emergency control circuit was added to the Section Controller's conference by emergency controller through his console.

4. The following features were also demonstrated in lab set up:

- The section traffic controller shall be able to give ring to the way station telephone for ASM (Assistant Station master) even if this phone is busy in conversation or not properly restored to "On Hook" condition.
- If ASM is busy in conversation, he will be added to the controller's conference.
- Only one phone will be provided with ASM. This phone could be used for communication with all controllers. The control phone at a way station for ASM shall be able to receive call from any of the controller pertaining to that section. Despite this, the section traffic controller will always be able to talk to ASM irrespective of whether his phone is free or busy. Also, the incoming call from section traffic controller to ASM's way side telephone shall generate distinct ring tone, which will enable ASM to differentiate from a distance, whether the call is from section controller or from some body else.

5. The following features will be added during actual field trial

- Call setup status indication on Controller console will be provided. The different stages of call setup to be indicated with different colors when controller calls ASM.
- If any ASM's phone is disconnected from VoIP network, then controller's console shall show "out of order indication" for that particular ASM.

6. Possibilities: The following possibilities also exists which can be implemented over SIP based solution:

- Instant messaging between various subscriber. ASMs, controller may interchange information through messages instead of making a voice call. This could be used by ASMs to give train

position to the Section controller, thereby reducing the volume of call traffic and workload on section controller.

- Emergency broad cast messages to a pre-defined group on their mobile telephones through GSM gateways.
- By installing client software, mobile telephones could also be used as control telephones.
- PA system of a particular station can be selected from control office and centralized announcement can be made.
- VHF gateways can be provided at way stations. This will enable using stations VHF radio from the control office to make conversation with driver/ guard.
- Controllers console can be used to make call on mobile telephones also through GSM gateway. Making calls on mobile network in place of using mobile can offer many advantages, e.g.
 - Availability of call log
 - Possibility to record the conversation
 - Antenna of GSM gateway can be placed at a location to enable better connectivity.
 - Conferencing with way stations

Out of these possibilities, vendor will try to demonstrate some of these during field trials itself. These could be added in the next version of RDSO specifications:

7. Conclusion:

In the lab demonstration all the existing unique features of control communication could be demonstrated. The VoIP based system provides some additional features also. The user interface for section controller and ASM will also improve. Some new possibilities have also come up. With all this, the VoIP based system can change the way, the section traffic control works.