Title of the Invention: SRGW1 TCP/IP TETRA gateway

Abstract Title: Gateway for connecting TETRA switch to IP based dispatcher system

A single electronic computerised gateway box, SR GW1, with bespoke interfaces allows interconnectivity between a TETRA or P25 narrowband radio technology switch and standard TCP/IP versions 4 and 6 (IPv4/IPv6) command and control or control room dispatch systems. It allows infinite or large number of radio to smart mobile phone talkgroups (between 1-1000) known as PTT "push to talks" depending upon the bandwidth of the radio manufacturer's interface. The gateway connects to the Motorola™ TETRA family of products (specifically to Ambassador™ and Dimetra™ switches) via the AEB (Ambassador Electronics Bank) or CEB (Central Electronics Bank) interface. The gateway collects relevant voice calls and packages them into TCP/IP Voice over IP calls using SIP (Session Initiation Protocol). The connectivity can be through an RS232 asynchronous or full synchronous connection or E1 carrier interface into the CEB and then connecting via RJ45 UTP or Fibre LC connection into any other 3 party dispatcher service product, thereby allowing an infinite number of talk groups as opposed to the conventional 4 wire system which has a limitation of around 150 talkgroups per device.
Motorola TETRA CEB interface

SR GW1 Part number 1

TCP/IP RJ45 or LC fibre interface to Cisco IPICS

Interface 0/1

Connection to SRGW1 via RS 232 or RJ 45 IP

Cisco IPICS LMR 2911 router Ver 4.5 as an example this could be ANY TCP/IP Based 3rd party vendor dispatcher system

1 gigabit interface to Cisco IPICS server console

IP interface

1 NM16AM
4 1gig or 10gig, or 100 gig interfaces
2 x RS232 interfaces
2 power supply’s 240v AC

Radio Interface TETRA

WiFi or MNO LTE or 3G Bearer

WiFi or 3G Smart iPhones with Cisco PTT/VTT apps loaded

Router

WiFi or 3G for IP smart devices to connect to Cisco IPIC’s Server for POC of PTT/VTT

Stand Alone Equipment
The following terms are registered trade marks and should be read as such wherever they occur in this document:

Motorola
Cisco
Unix
Dimetra
SRGW1_TCP/IP TETRA Gateway (SR GateWay 1)

Background:

There is currently a need for smart phones (IE: handheld electronic mobile phones Apple iPhone & Android phones, we will refer to these devices as smart phones and / or smart devices throughout this document) to communicate with Radio devices (IE: TETRA, In specific to this design Motorola product family of TETRA switches, Ambassador and Dimetra family).

Specifically TETRA uses Multiplexing protocol to divide each individual voice channel or voice call or talk group. The talk group(s) are controlled by zone controllers (Motorola Dimetra product) by devices known in the industry as a Dispatch Console or Control Room Dispatcher who’s function is to Patch the relevant person with the handheld TETRA radio to another or a group of TETRA handheld(s) radios(s). This creates a voice NOT DATA talk group(s) between individual(s). There can be anything between 50-1000 + talk-groups per TETRA network.

There is a need for a Smart Device(s) to have the ability to communicate with the TETRA radio system. This can be achieved via what is known as a 4 wire E&M card (Cisco IPICS solution) using any Cisco 2901, 2911, 2951, 3925, 3945 series routers, with Cisco IOS version 15x software and the following line cards (See IPICS Matric table listed APPENDIX 1) and call manager software. The result is a LMR (Land Mobile Radio) which connects to the TETRA and / or P25 radio network via a 4 wire E&M card. The LMR acts as a gateway for the TETRA & TCP/IP Smart Device(s) and provides the facility for both devices to create talkgroup(s) group call(s) between devices for Voice communication. For data and voice the IP smart phones can send/ receive to all components within the network nodes i.e.: dispatcher & other Smart Device(s) Desk Phone(s) and Voice Call(s) to TETRA radio(s). This type of service is what we call unified communication or Hybrid.

However this unified communication or Hybrid service has its limitations. The 4 wire E&M interface is legacy and has restrictions on the technology for integration and design. The limitations are on:

1. The number of talk groups the design is capable of.
2. The overall connectivity on the design between TETRA & IP via LMR
3. Software and protocol used for the Talk-groups.
4. Cost effective scalability is expensive.

There are significant step change improvements which can over-come the limitations in the current design, which are set out in this text.
Summary:

The design is a single box referred to as a Gateway name srwg1. The Gateway has the ability to communicate using Software which is UNIX based and or 3BSD code (16-128bit software with 256 bit encryption ability and TCP/IP stack) will connect to the Motorola TETRA family of products (In specific to this design Motorola product family of TETRA switches, Ambassador, Dimetra) via the AEB (Ambassador Electronics Bank) or CEB (Central electronics bank interface) from here the srwg1 will collect relevant voice calls and package them into TCP/IP Voice over IP calls by using SIP protocol. The connectivity will be through an E1 (E-carrier) circuit asynchronous or full synchronous connection into the CEB or AEB port within the Zone or Motorola Ambassador switching unit this will inter-connect via an RJ45 UTP or Fibre LC connection using the TCP/IP Protocol and routing functionality into the Cisco IPICS or any other 3 party Dispatcher Service Product. This design will allow an infinite number of talk groups as opposed to the 4 wire system which has a limitation of say 150 talkgroups per device.

Thus the SRGW1 will be a gateway will:

1. Connect to the AEB or CEB Motorola family of product’s listed.
2. Allow significantly large volumes of talk-groups per device (Per srwg1) say up to 1000 + voice and data talk-groups as an example between TETRA and Smart Device(s) by use of TCP/IP version 4 or Version 6 for Push To Talk service (PTT).
3. Have 100Mbps 1gigabit, 10gigabit, 100gigabit interface to connect to a 3rd party dispatcher service product such as Cisco IPICS and other similar service products (iccS).
4. Provide significant scalability and efficiency improvements.
Claims:

A single electronic device which uses software and hardware to connect to the Motorola Dimetra TETRA product family mentioned and allows infinite number of talk-group(s) to connect via TETRA mobile handsets and smart devices mentioned.

A single device which interoperates via TCP/IP ver 4 & Ver6 routing protocol (both Static routing and Dynamic) and SIP to allow infinite number of talk group(s) and data via to be transferred via dispatcher.
Application No: GB1307001.6
Examiner: Mr Jared Stokes
Claims searched: 1 and 2
Date of search: 23 October 2013

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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<td>WO01/45335 A1 (Nokia) See abstract, page 8 line 1-page 10 line 32, figure 1</td>
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<td>WO2007/088247 A1 (Teliasonerwa) See page 4 lines 9-16, page 11 line 1-page 14 line 23, figure 5</td>
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Categories:

| X | Document indicating lack of novelty or inventive step |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. |
| & | Member of the same patent family |

| A | Document indicating technological background and/or state of the art. |
| P | Document published on or after the declared priority date but before the filing date of this invention. |
| E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

Field of Search:
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:


Worldwide search of patent documents classified in the following areas of the IPC
H04L; H04W

The following online and other databases have been used in the preparation of this search report
EPODOC, INTERNET, WPI
**International Classification:**

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