Belgrade – 18 May 2010

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Motorola for Mission Critical Solutions

Enterprise Mobility Solutions

TETRA

Project 25 Astro

DMR - Mototrbo

Professional 2-way radio

Wireless Broadband Solutions

Data solutions

EMB - Symbol

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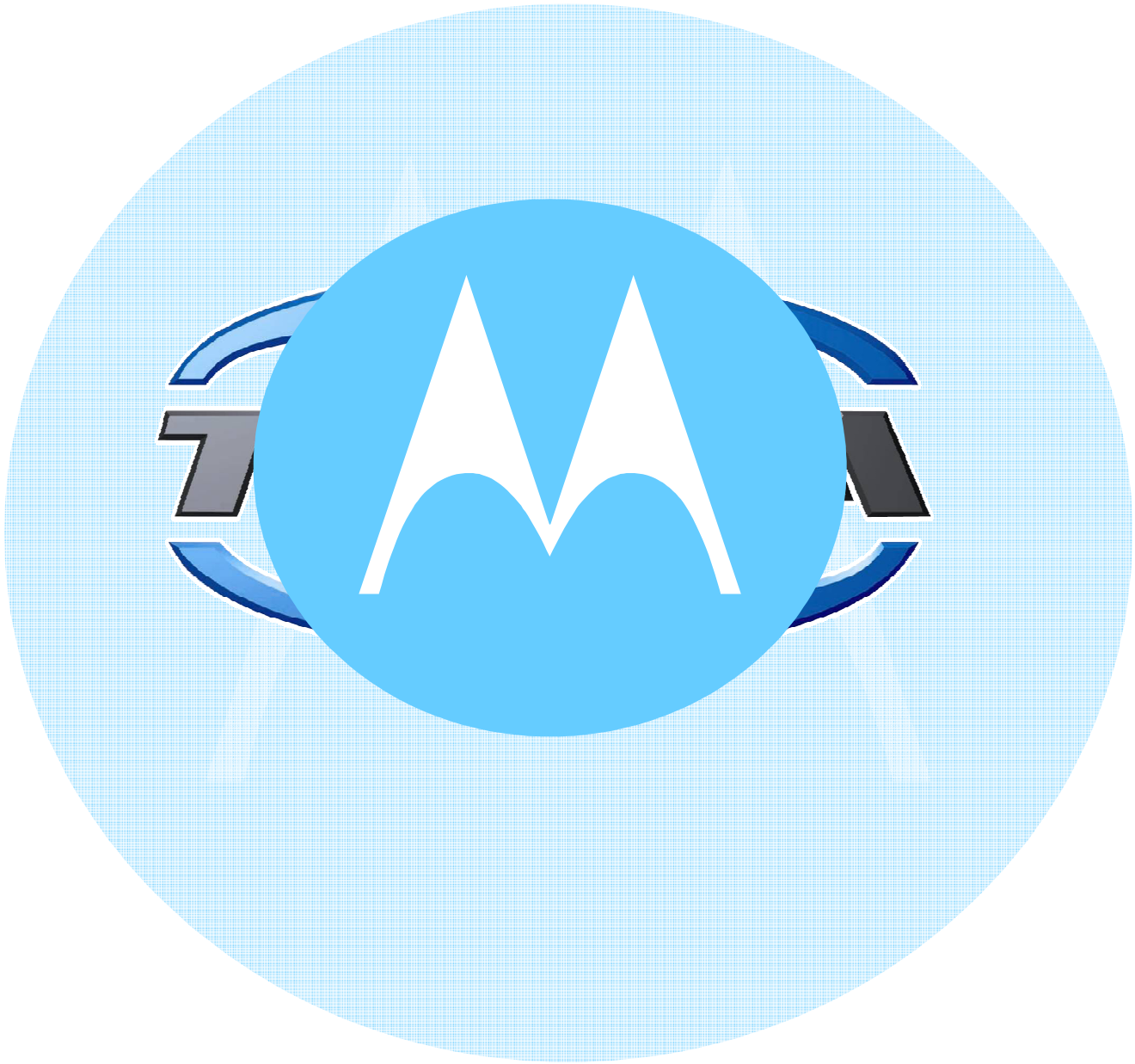

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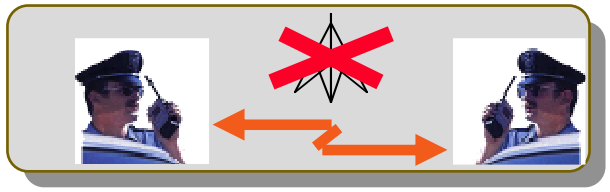
TETRA Phase 1

Trunked radio solution
Supports DMO for out of network operation
Full duplex – (TDMA)
Spectrally efficient – 25 KHz
Modulation - $\pi/4$ QPSK
Multiple frequency bands, 330–350, 380-400, 410-430, 450-470, 800 MHz
Requires contiguous spectrum
Multiple levels of encryption Air I/F, E2E
Integrated Voice & Data

DMO



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TETRA Phase 2 – TEDS
TETRA Enhanced Data Service

Backward compatible with TETRA Release 1

- **Network integration capability**

Flexible data rates and spectrum use

- **25, 50, 100 and 150 kHz channels bandwidths**
- **Can trade off data rate, spectrum and range**

Integrated TETRA 1 and TEDS system

Technology selected for TEDS use

- **Multi-carrier QAM (Quadrature Amplitude Modulation) in all bands**

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Objectives of TETRA Release 2.0

Tetra 2 standardisation driven by users

New services standardised

- **Enhanced cell radius, also referred to as Trunked Mode Operation (TMO) - Range Extension:**
  - **Extends TETRA range beyond 58 km, reaching a maximum of 83 km**
  - **Part of an efficient air-to-ground communication solution**
- **TEDS (TETRA Enhanced data service)**
  - **High speed packet data for TETRA**

TEDS and TETRA 2 are extensions of the TETRA standard

- **TEDS network and subscribers are backwards compatible to TETRA1**

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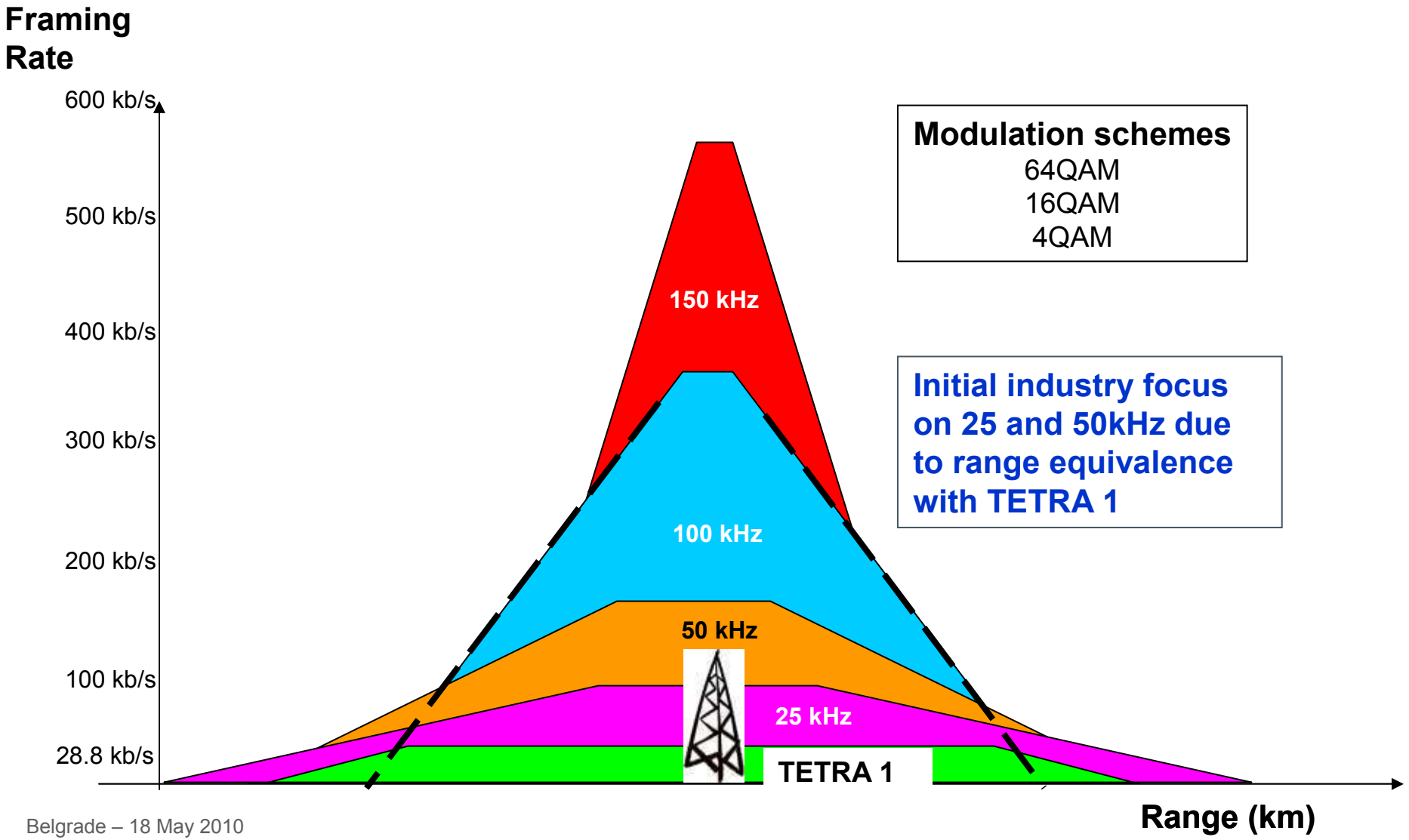
TEDS comparison with TETRA 1



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Nødnett - Norwegian national multi agency public safety digital communication system

core TETRA network infrastructure
software
implementation services
maintenance
implementation started 2007
nationwide in 2012

- **The technology and services also support the future development of the nationwide system, including the provision of higher data speeds to support the deployment of advanced mobile data solutions**

Commitment to Tetra

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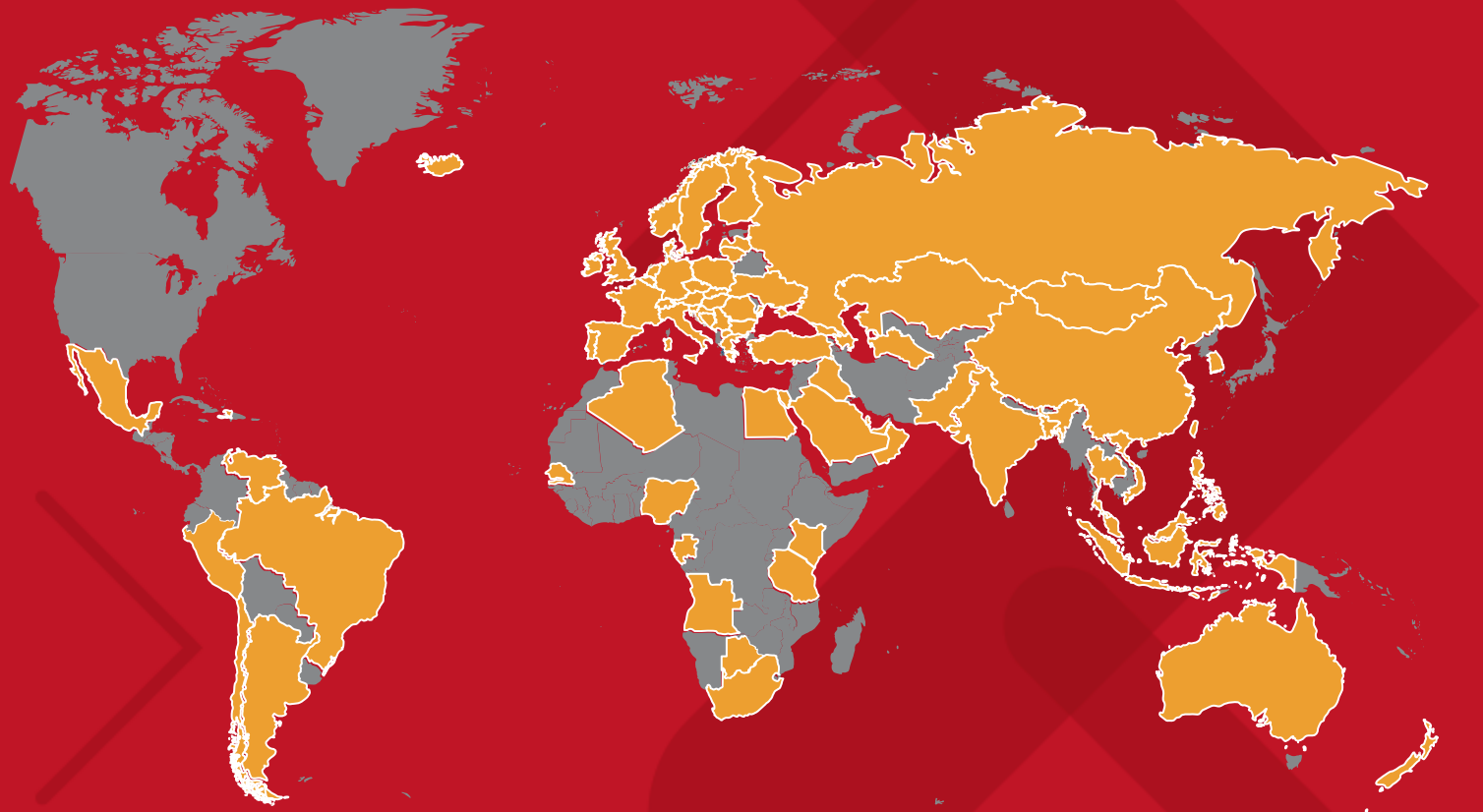
Motorola in TETRA – A Proven Success



- Over 450 customers
- In over 85 countries
- Over 1,000,000 terminals sold

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Commitment: To Partnerships

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Commitment: Great Britain

Airwave World's largest TETRA system today

Each regional Force is managed from its own independent Control Room

Technical support is available 24 hours a day, 7 days a week until 2021

Seven IP switches delivering nation-wide coverage

Coverage includes major / minor roads and enhanced terminals coverage for urban areas

Roll-out from 2001 to 2005

53 police forces live plus multiple other users and agencies

3,672 sites live

Over 200,000 users registered

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Portfolio

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Portfolio: A Complete Solution

IP Network

Complete scalable switching solution

All IP architecture

Future proof

Radio Access

New base station design

Best in class feature set

Best sensitivity, best coverage

Devices

Portables

Mobile & gateway repeaters

Integrated solutions

Applications

Services, application delivery framework

End-User applications

>150 authorized partners

Services

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Portfolio: Motorola's Devices

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Celebrating 1,000,000 terminals shipped

Motorola's Portable Devices

MTP850S Product Tour

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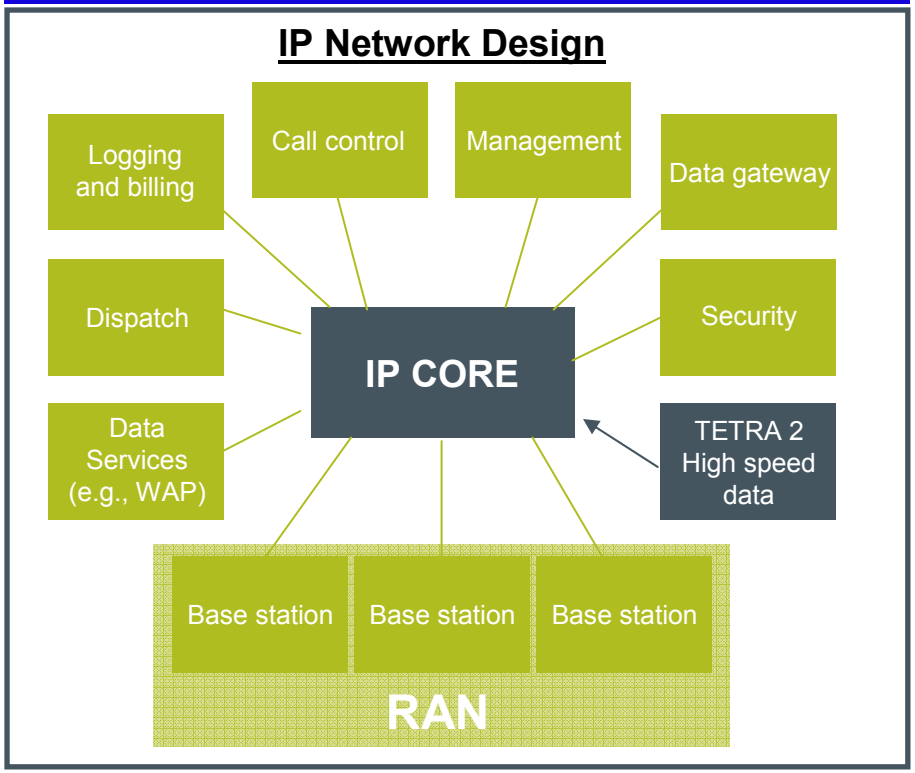
Portfolio: All IP Network

All IP Network Architecture:

- Solutions from small local to full nationwide
- Scalable for both voice and data
- In-built resilience
- Advanced security
- Future proof
- Fast nationwide call set-up

Complete Core Network Solution:



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Base Station MTS-2 and MTS-4

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Base Station MTS-2 and MTS-4

- Base Radio Low or High Power
- TETRA Site Controller (redundant option MTS4)
- Environmental Alarm System (EAS)
- Antenna Combiner
- Power Supply with Charger 230VAC / 48VDC (charging of external batteries)

Technical Data:
- Footprint (0,57m x 0,55m)
- Power Consumption max. 1200W at 25W RF-Power and 4 RF-Carrier
- Power Consumption max. 300W at 10W RF-Power and 2 RF-Carrier
- Best in class receiver sensitivity (113.5dBm faded at 4% BER)

MTS-2

up to 7 Traffic Channels

MTS-4

up to 31 Traffic Channels with Expansion Rack

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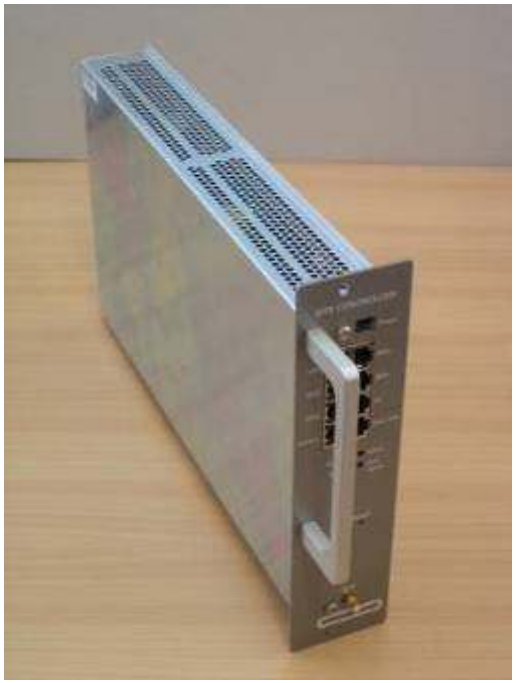
Base Radio & TSC

- **High integration and extremely compact**
  - **Exciter, Receiver, Power Amp and BRC**
- **Highly power efficient**
- **High power 75 W & low power 35 W**
- **Three receivers with high sensitivity**



Tetra Site Controller

Base Radio

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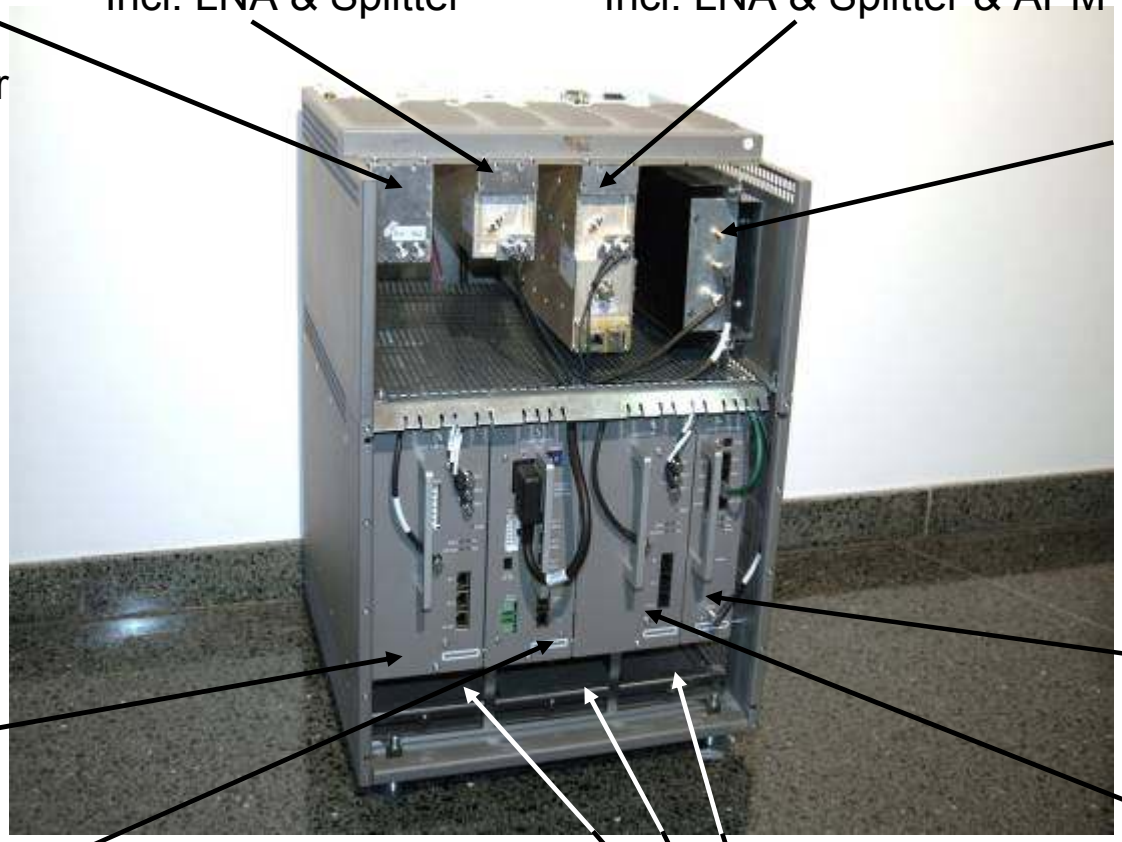
MTS 2



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MTS-4

Duplex Filter

Cavity Combiner

MTS2 Chassis with 4 Base Radios and PSU

Door Contact

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Expanding Portfolio of Base Site Solutions

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Dimetra IP Compact

Dimetra IP Compact R3.0 Offered Feature Overview

System Capacities

- Supports up to 25 sites
  - MTS4 and MTS2 Base Stations
- 20 Consoles
  - Vortex MCC7500
  - Local or remote operation
- Up to 5 Network Manager Terminals
  - Historical reports
  - Alarms & Monitoring
  - Zone Watch
  - Local or remote operation
- System Redundancy
  - Redundant LAN Switch, Zone Controller and GW Router
  - Geographical Redundancy
  - MTS4 Redundancy capabilities

Supported Services

- Voice Services
  - Individual (Simplex and Duplex)
  - Group Call / Multi Group Call
  - Telephone Calls (Duplex)
- Dispatch voice call services
  - Emergency Calls
  - Dispatch patching
  - DGNA
  - Site Wide Call
- Data Services
  - Status Messages
  - Short data Services (SDS)
  - Packet data Services (PD) (Single and Multislot)
- Security Services
  - Authentication (AuC) and Provisioning Centre (PrC)

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Motorola Dimetra IP Compact

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Dimetra IP System

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Dimetra IP Compact Switch Cabinet

Dimensions HxWxD mm:

1330*600*980

Power Consumption (kW): max 2.5

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MCC7500 Dispatcher Terminal

(Voice over IP Dispatcher System)

HP XW4300 Workstation with 19“ TFT display

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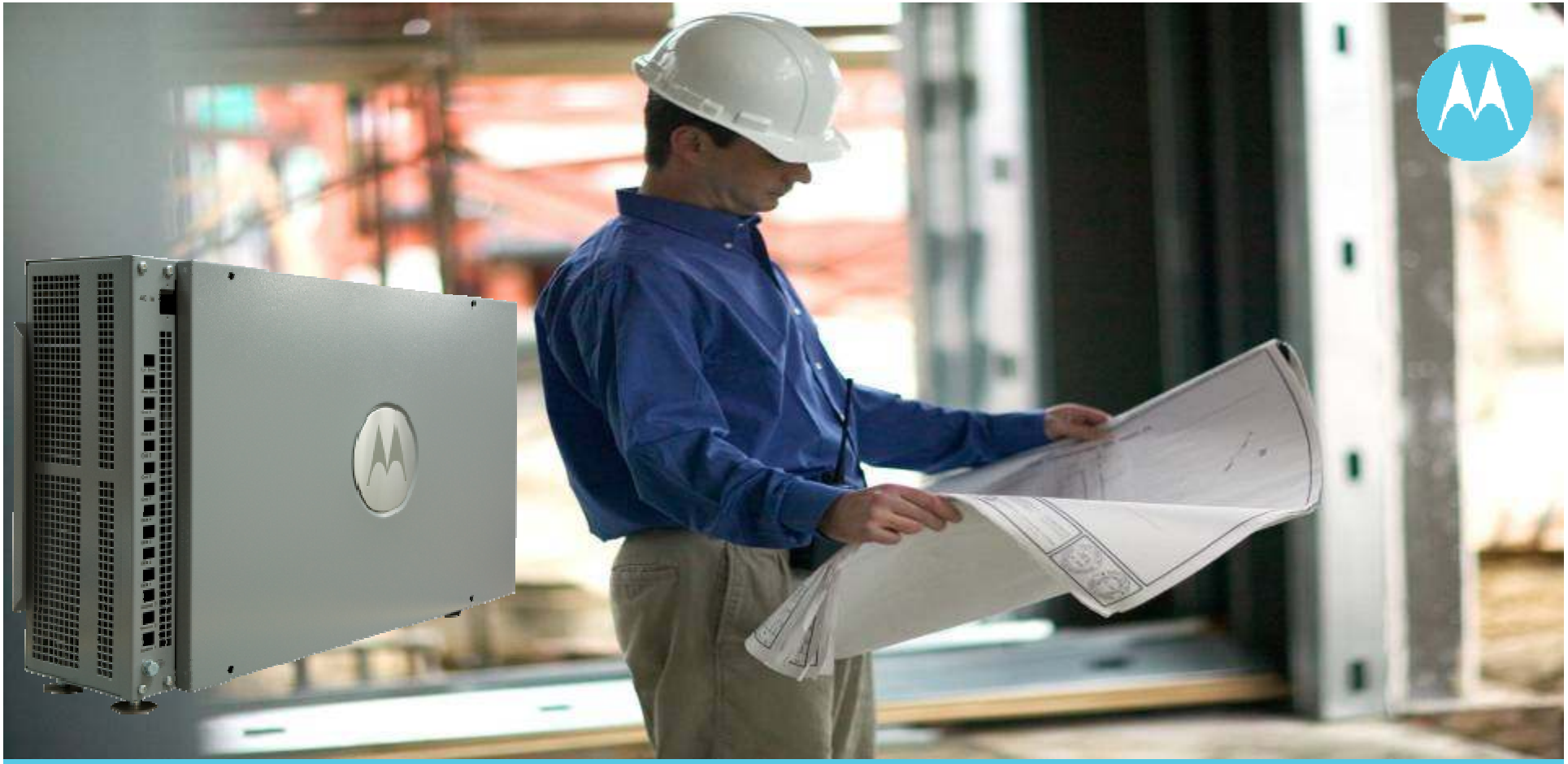

MOTOROLA DIMETRA IP MICRO

Scalable TETRA Infrastructure for Commercial and Enterprise Applications

Belgrade – 18 May 2010

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Dimetra IP - Dimetra IP Compact and Dimetra Micro

Scalable from Small to Nationwide

Up to >5000 sites

Mission-critical operations/features

Voice, QSIG Telephony, SDS, SSPD, MSPD, Authentication, AIE, E2EE, Redundancy

Mission-critical customers

Nationwide Dimetra IP

Dimetra IP Compact

From Single-site up to 5 sites Dimetra

Business critical operations/features

Voice, VoIP Telephony, SDS, E2EE (radio only)

Target Enterprise customers

Dimetra Micro

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Product Overview

From Single Site to 5 sites Dimetra IP solution

Support up to 1500 radios, 250 TG

Core Dimetra IP features:

- **Group call, individual call, emergency call, ambience listening, site trunking**
- **SDS Service**
- **Status, Free text (1000 ASCII characters), Group SDS, SDS Store and Forward**
- **Telephony service**
- **Wireline console**
- **Support for conventional channel interface**

Reuse MTS base station

Ethernet site link

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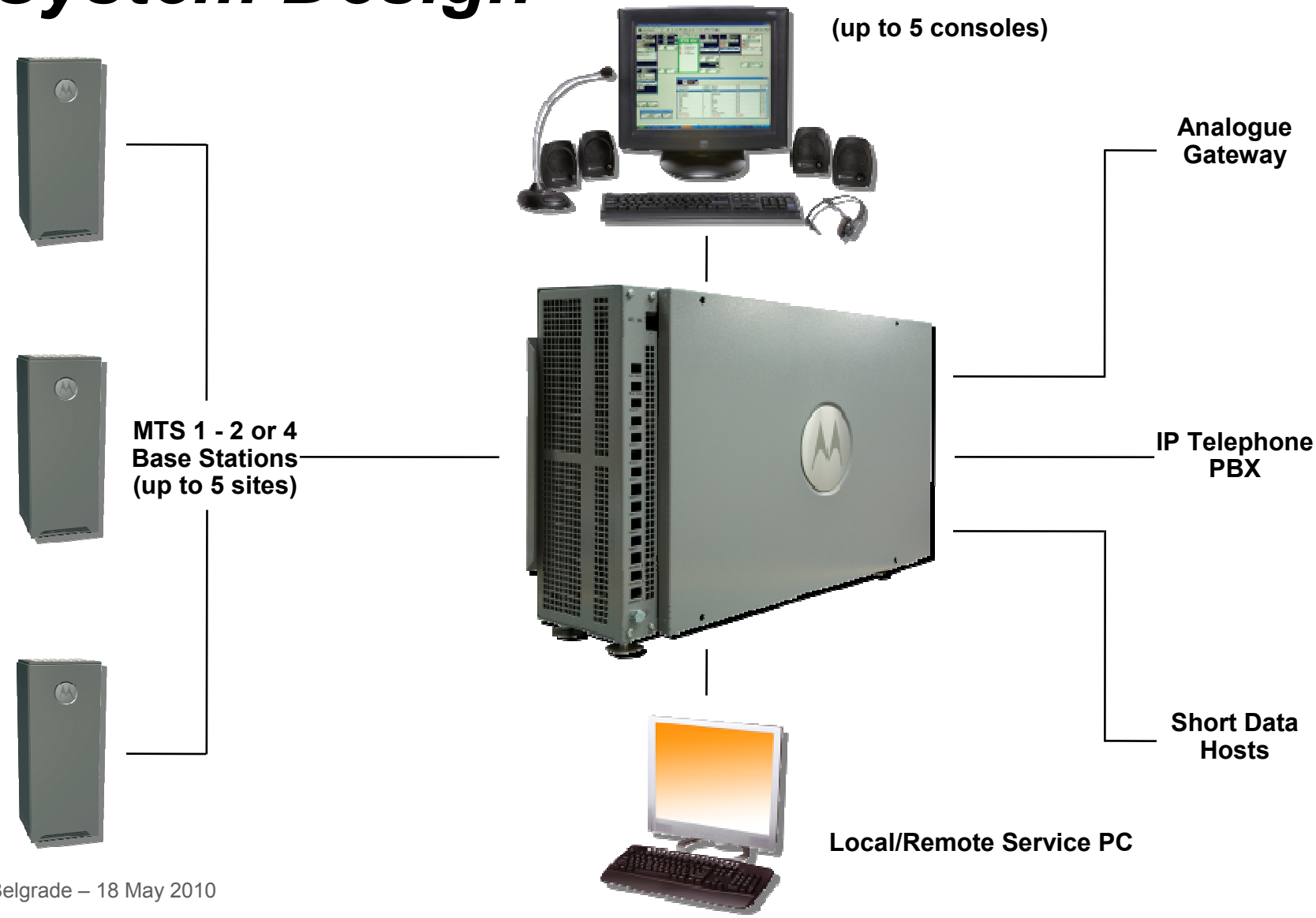
System Design



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Key Differentiators

- **Easy to ship (one compact box)**
- **Easy to deploy (plug & play)**
- **Easy to configure (Web based configuration of key objects)**
- **Easy to operate (improved backup/restore, easy to use manuals)**
- **Easy to support (fully remote supportable)**
- **Easy to upgrade (remote SW download)**

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HW Of Dimetra IP Micro

One Compact box

SUN SERVER – consolidation of Zone Controller, Air Traffic Router, User Configuration Servers, Zone Database Server, Short Data Router and the IP Telephone Gateway servers

S2500 Router – consolidates Core -, Gateway -, Border- and CCGW Router

HP2610 – Master LAN Switch

VPN Gateway – Remote access for service and maintenance

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Easy to Configure

Initial configuration of system done at factory (with configurations for transport network and RF site)

- this will suffice for most cases, plug and play !

At customer site, default configuration can be altered if needed using Web NM interface

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Easy to Operate

Complete backup and restore of system configuration and data on a PC connected to system via a browser

Simple and easy to use manuals

Easy to upgrade

- **Upload new SW to switch via Web GUI on NM**
- **Remote SW download to MTS base station avoids need for site visit**

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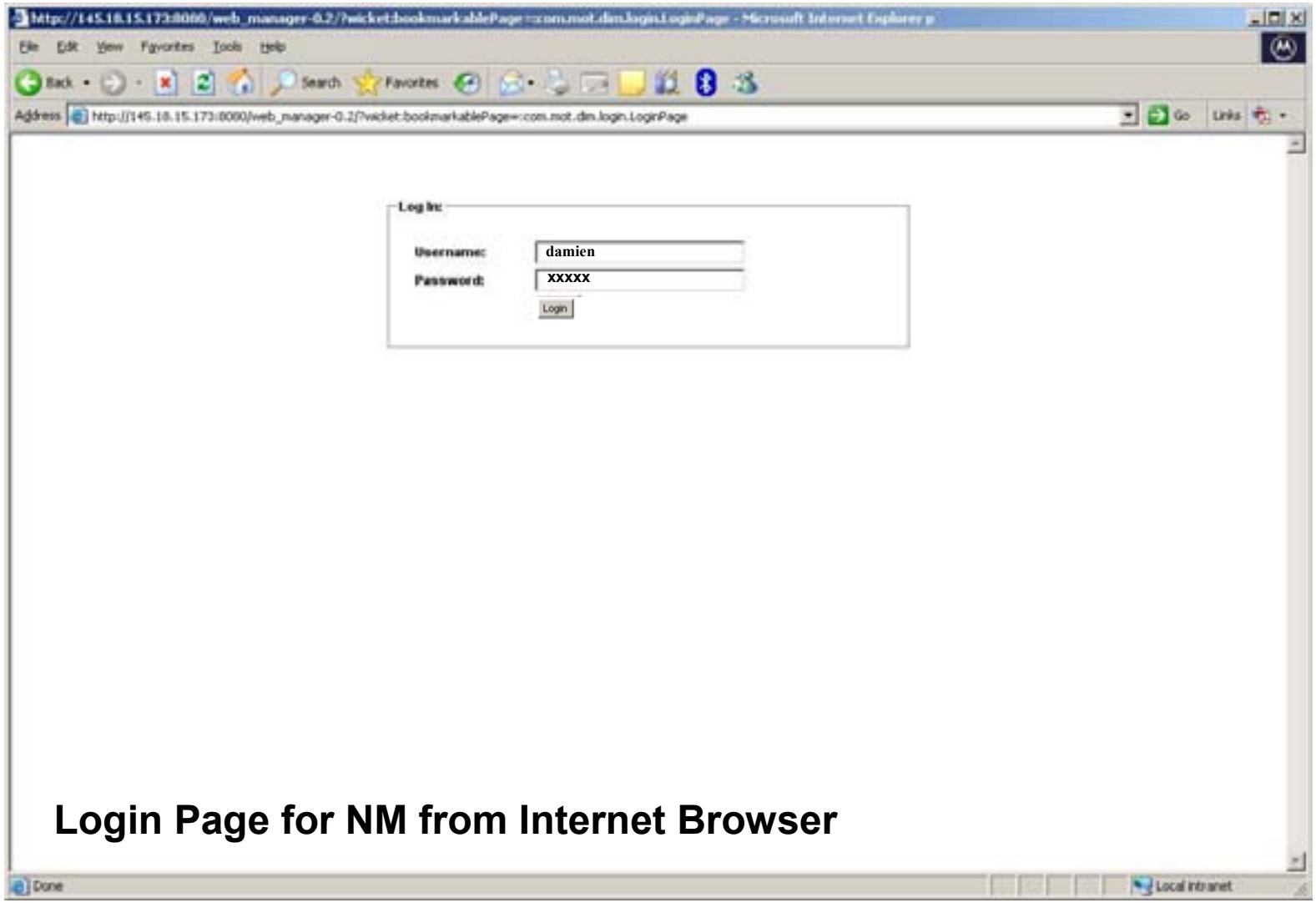
User Friendly Web Interface



Login Page for NM from Internet Browser

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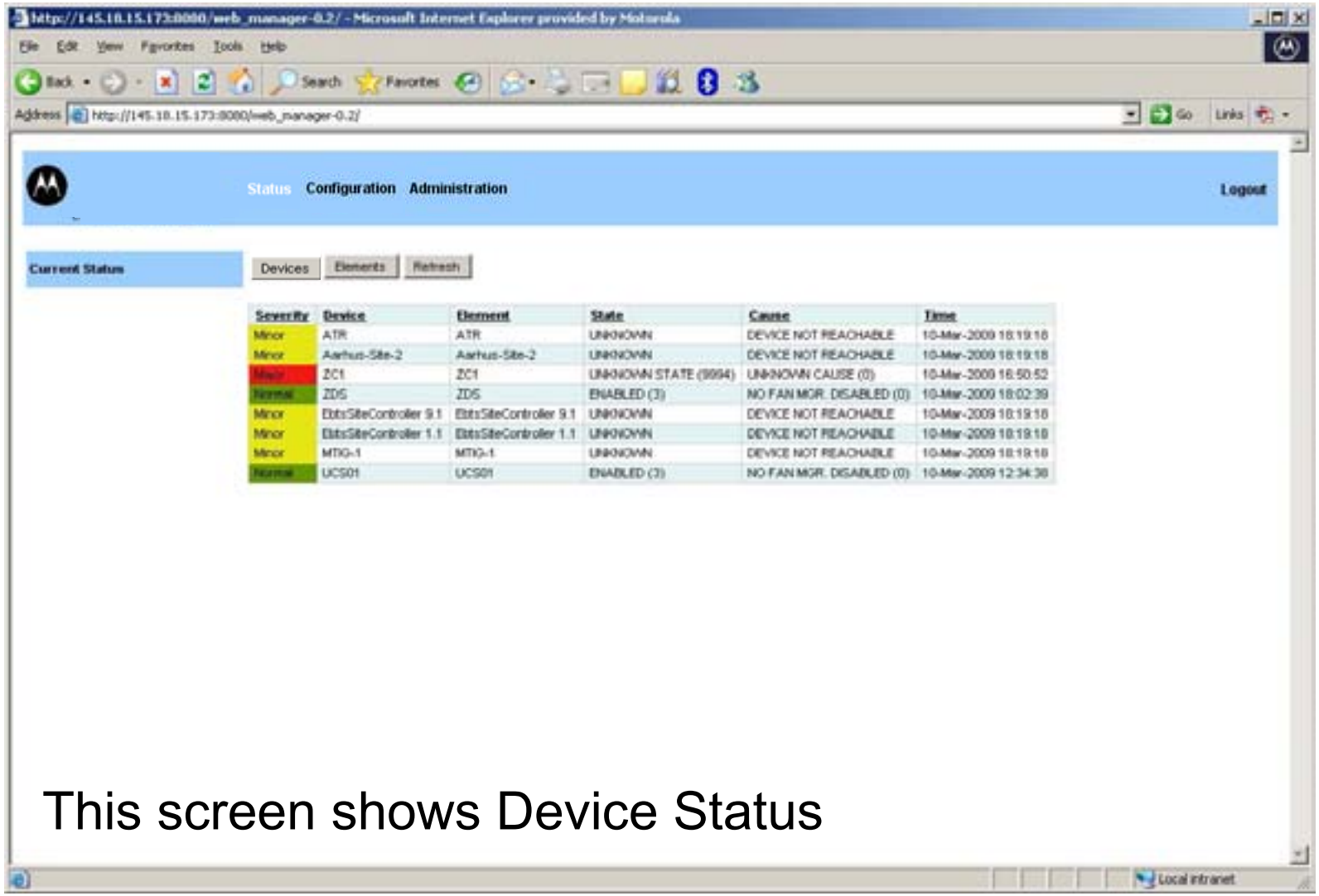
User Friendly Web Interface



This screen shows Device Status

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User Friendly Web Interface

This screen shows Detailed Status

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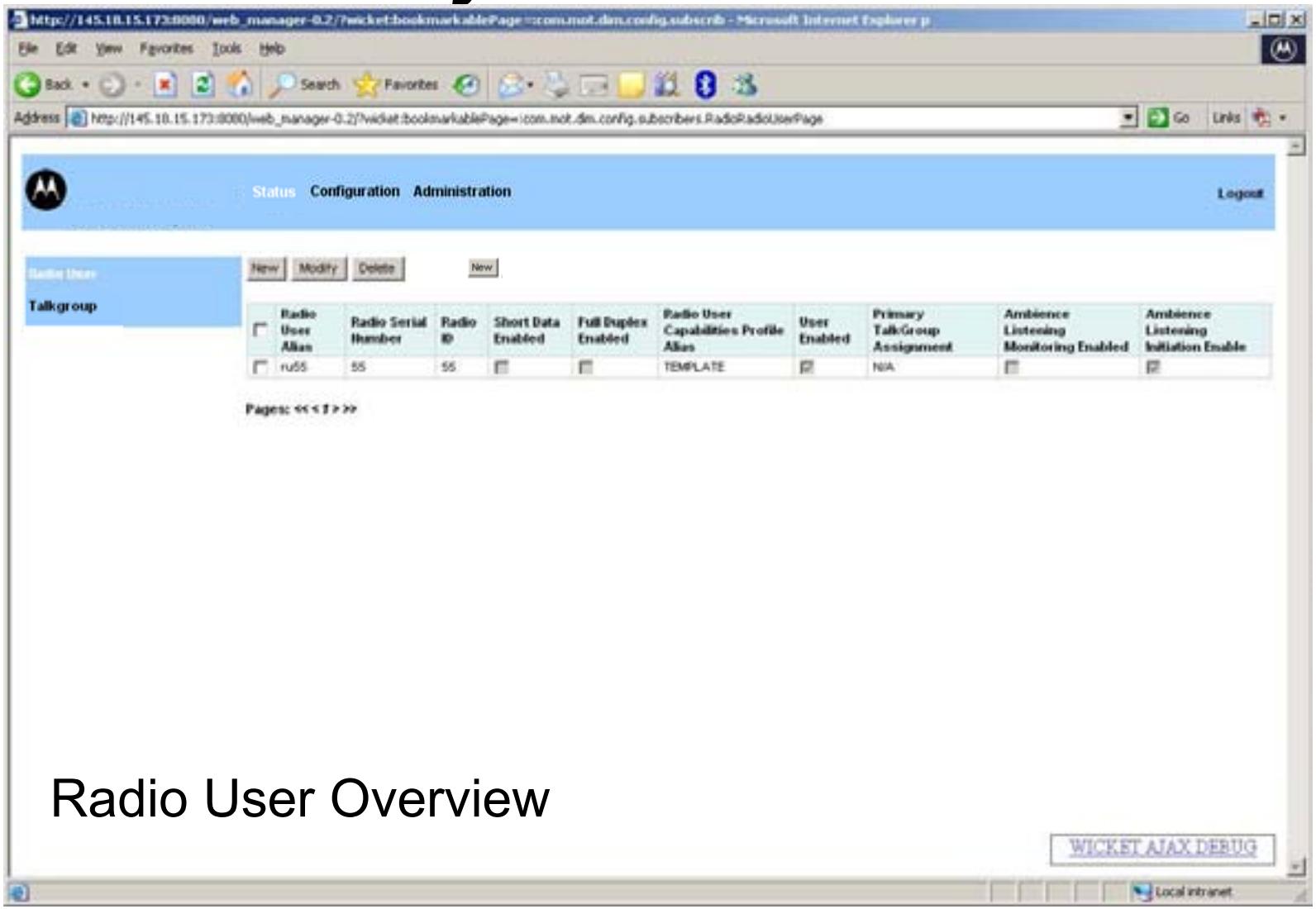
User Friendly Web Interface



Radio User Overview

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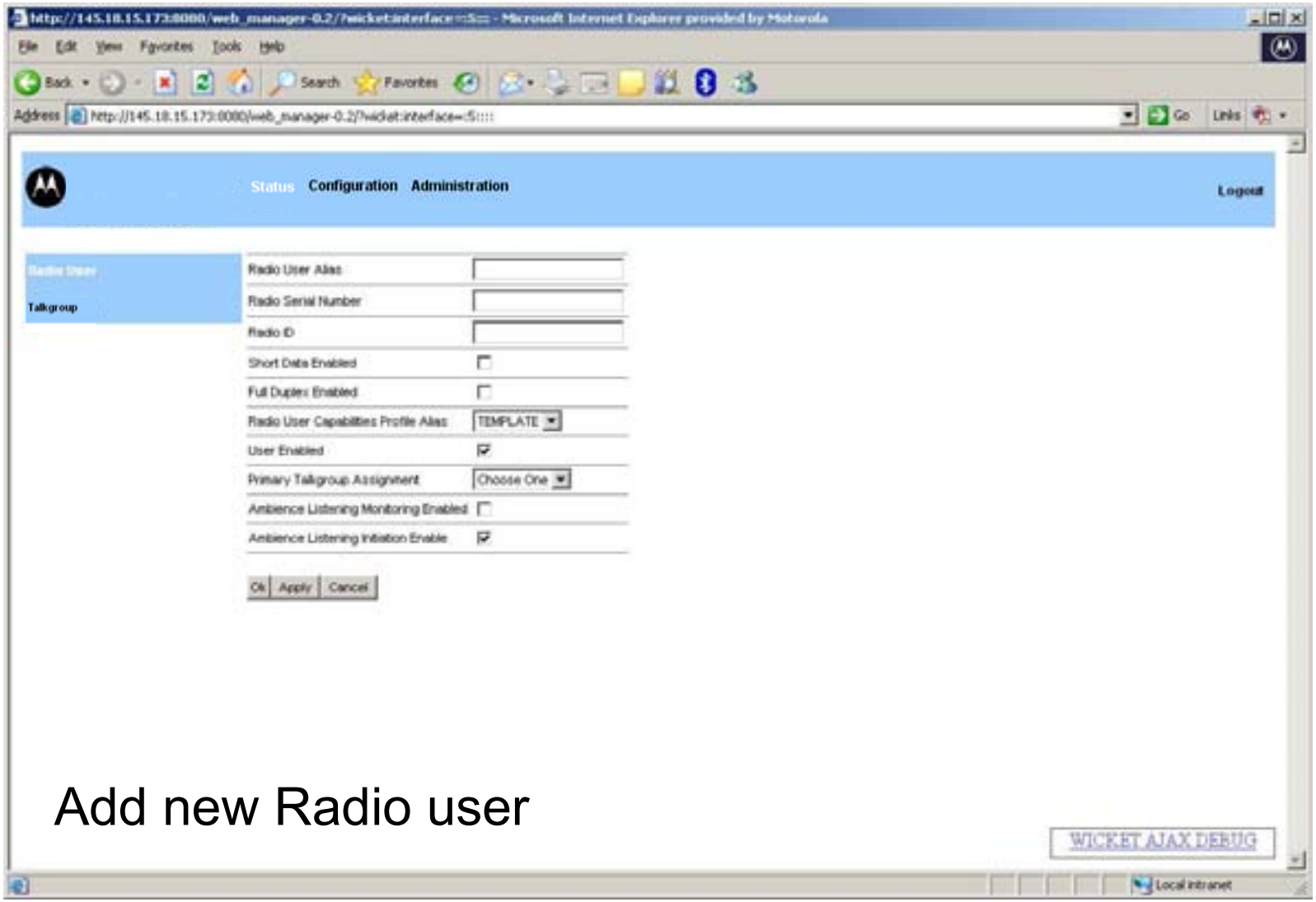
User Friendly Web Interface



Add new Radio user

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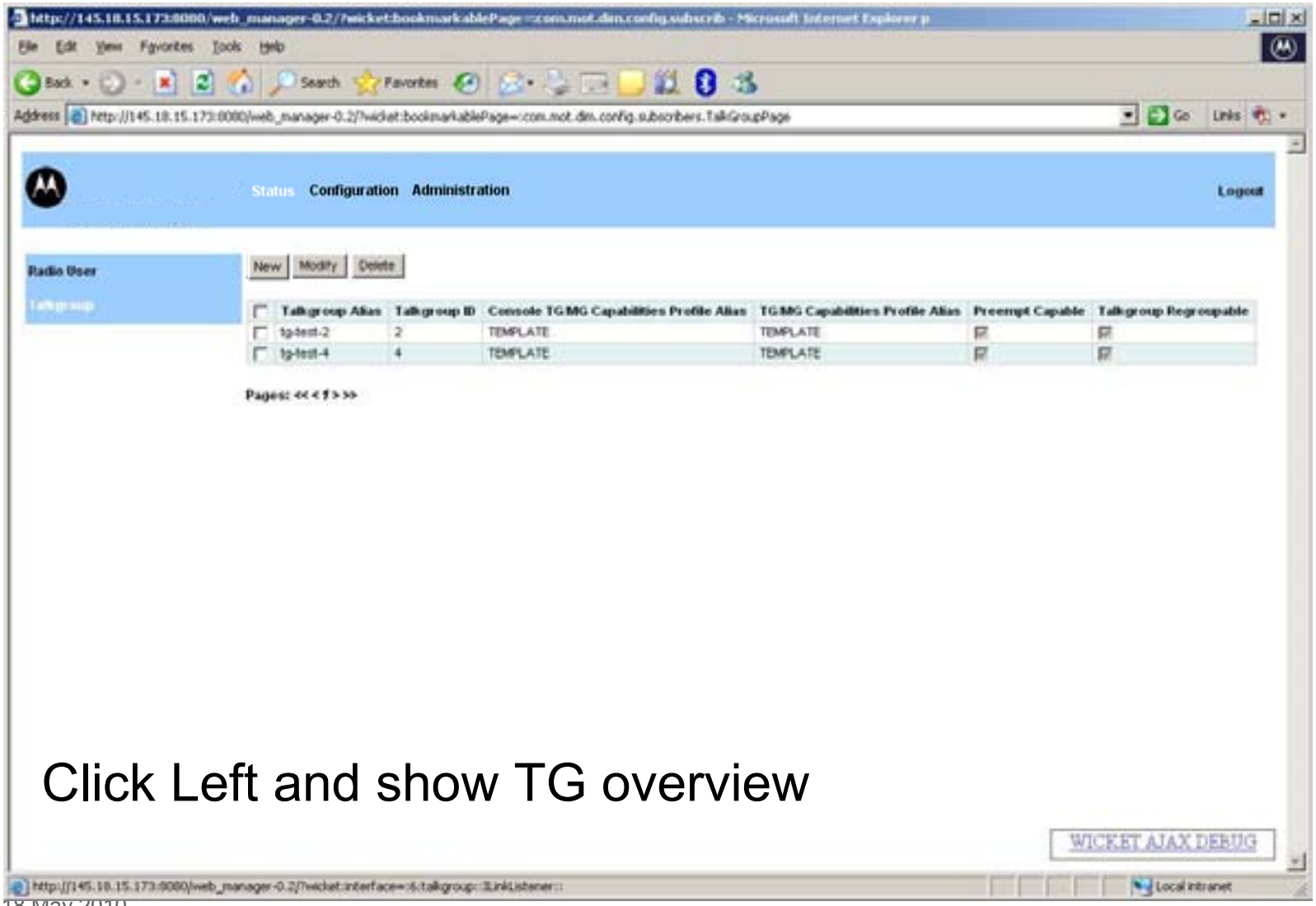
User Friendly Web Interface



Click Left and show TG overview

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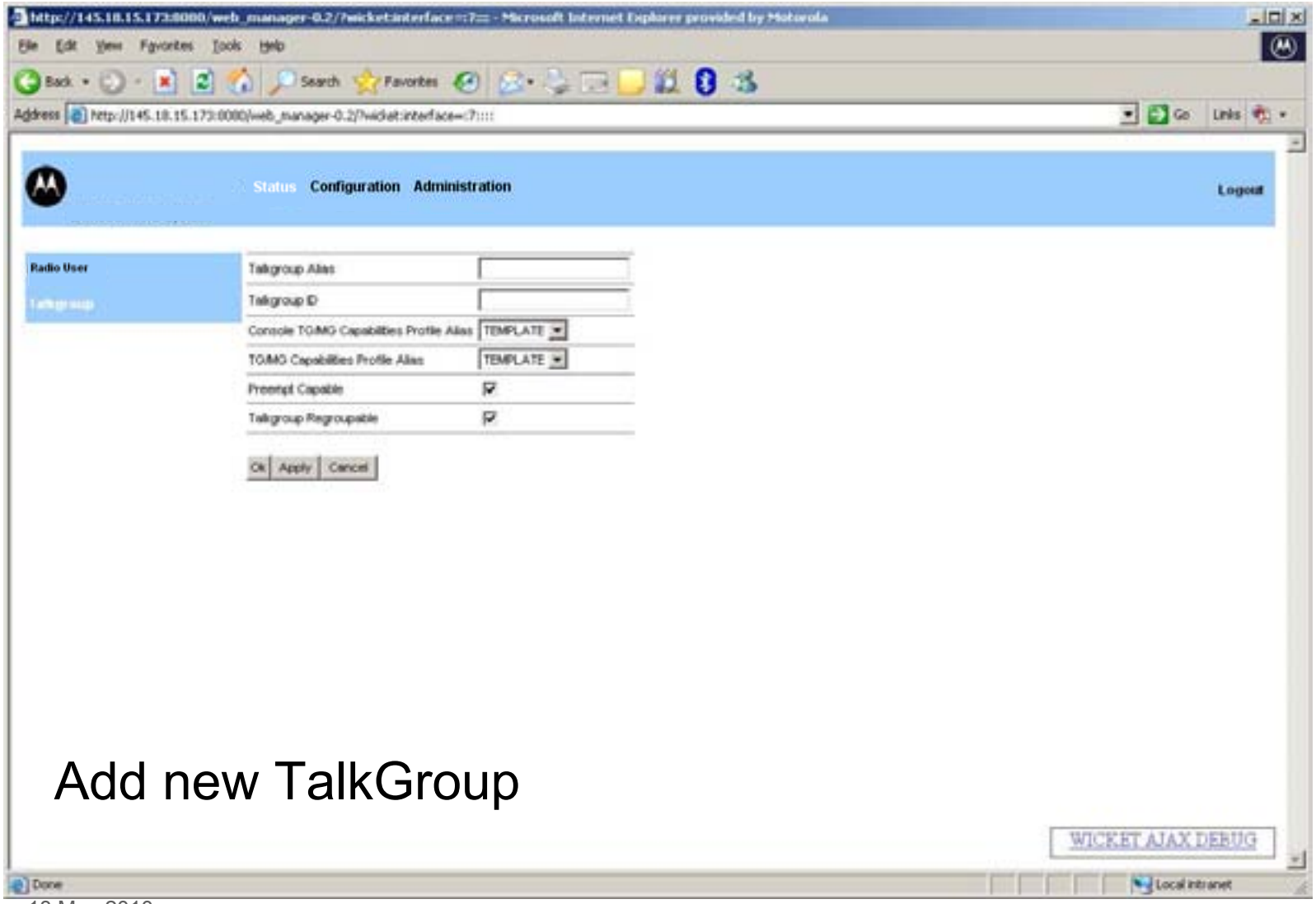
User Friendly Web Interface



Add new TalkGroup

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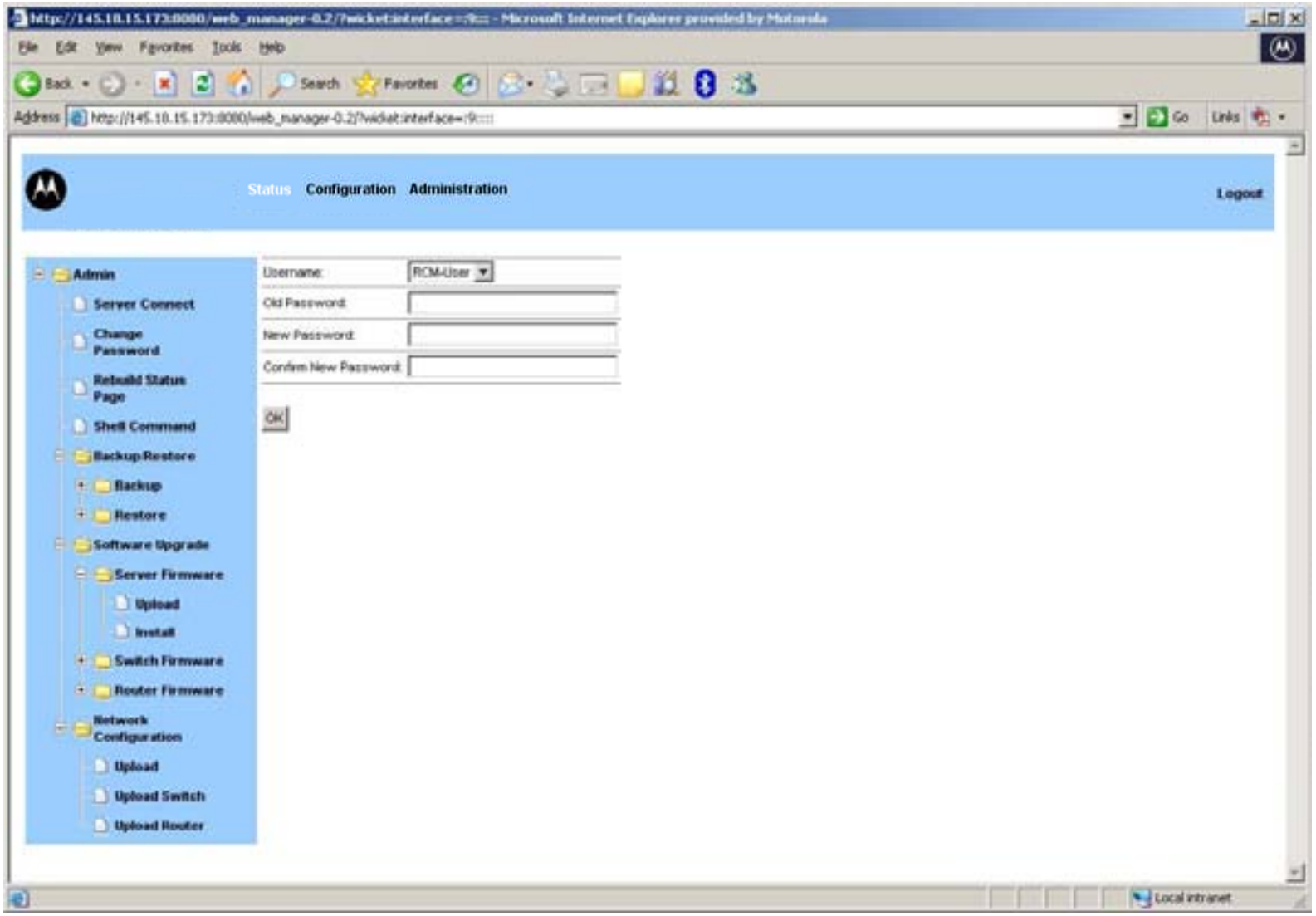
User Friendly Web Interface



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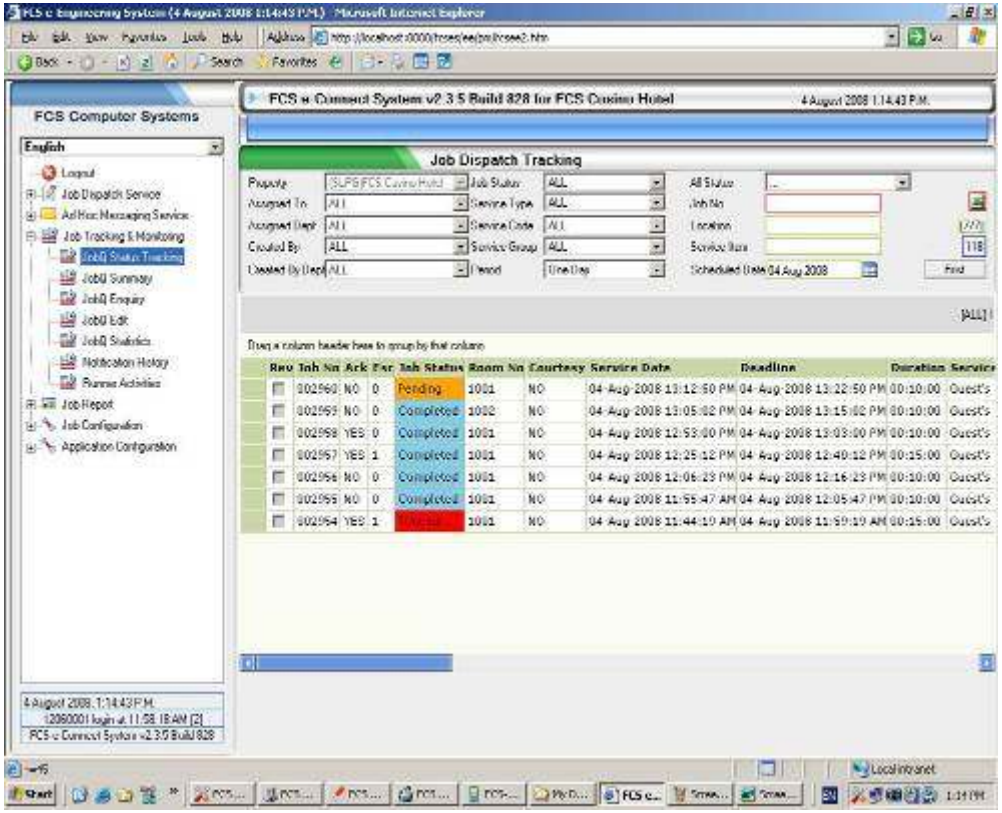
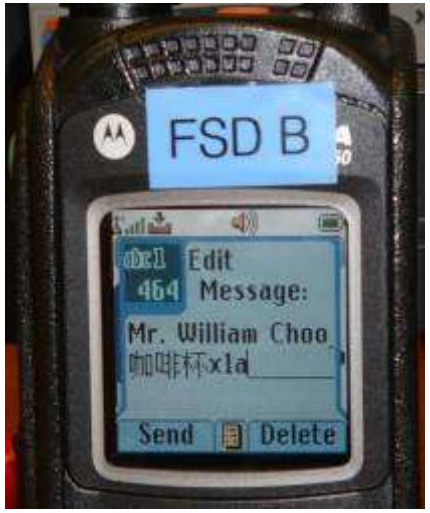
Job Dispatch Application





Job Dispatch application on Dimetra systems

Belgrade – 18 May 2010

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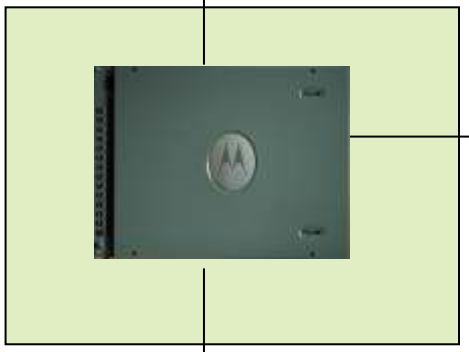
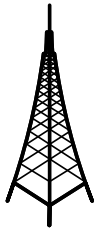
Cost Effective Solution to support migration to Digital

MTS

- **No disruption to existing Analogue users**
- **Progressive migration to Digital**
- **Investment protection**





Existing Analogue Systems

Console

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Dimetra Micro Summary

Leverage Dimetra's mission-critical architecture to business critical customers

Expand Target market to commercial markets, transportation market, gas and utilities, and hospitality using analogue systems with single site

Possibility to be sold as a package bundled with subscribers

Key advantages:

- **Low cost of ownership**
- **Robust and Reliable**
- **Cost effective Migration from existing analogue systems**

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Dimetra IP Micro – Scaling the benefits of Dimetra

Value and High Performance

Premium capabilities but not a premium price

Ease of installation and Operation

Web-based GUI and installation and operation

Migration

Interfaces with existing systems to ease the migration process

IP Interfaces

Saving cost and increasing flexibility

Optional Services

Telephony service, Voice over IP telephone calls. SDS and GPS options.

Backed by Motorola Services

Comprehensive pre and post sales support

Belgrade – 18 May 2010

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Technology that's Second Nature™

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