



## COURSE OVERVIEW IE0649 Tetra Communication System (VoIP)

### Course Title

Tetra Communication System (VoIP)

### Course Date/Venue

Session 1: April 13-17, 2025/Boardroom 1,  
Elite Byblos Hotel Al Barsha,  
Sheikh Zayed Road, Dubai, UAE  
Session 2: September 15-19, 2025/Fujairah  
Meeting Room, Grand Millennium  
Al Wahda Hotel, Abu Dhabi, UAE



### Course Reference

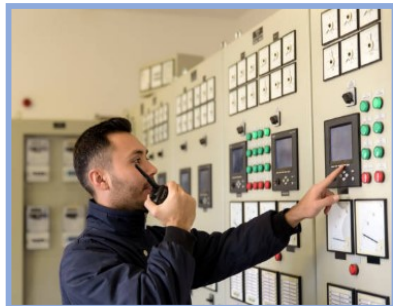
IE0649-4D-IH



### Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

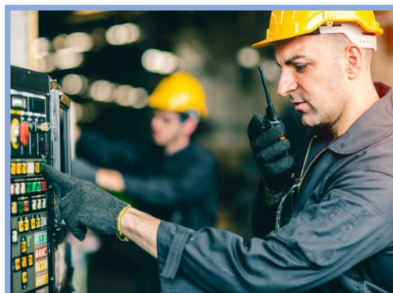
### Course Description



***This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.***



This course is designed to provide participants with a detailed and up-to-date overview of TETRA radio telecoms system. It covers the trunk mobile communications, trunking concepts and benefits, current trunk mobile systems, iDEN, Tetrapol and TETRA technology; the ETSI standardization, role of TETRA MoU, current operational TETRA equipment and systems; the possible future developments in TETRA technology; and the various features and services of TETRA including TETRA technology, voice and data services, bearer services, teleservices and supplementary services.



Further, the course will also discuss the circuit-switched data, packet switched data, IP packet data and short data service (SDS); the voice coding, management resourcing, direct mode operation (DMO) and support for value added services; the spectral efficiency, security aspects, service availability, range of applications for TETRA and TETRA as a PCS; the TETRA architecture covering BS, LSC, MSC, LS, MT, TE, network and standard interfaces; and the standard gateways, TM air interfaces, ISI, TEI, LSI, NMI, etc.



During this interactive course, participants will learn the TETRA air interface including spectrum allocations and channel assignment; the physical and logical channels, TDMA structure, medium access control sublayers, etc; the TETRA security and billing in TETRA networks covering authentication, encryption, end to end encryption and billing; the TETRA and public mobile systems pertaining to GSM services and features; the convergence of TETRA and GSM; the evolution of TETRA towards 3G services; and unifying TETRA and UMTS.

### **Course Objectives**

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on terrestrial trunked radio (TETRA) telecoms system
- Discuss trunk mobile communications covering trunking concepts and benefits, current trunk mobile systems, iDEN, Tetrapol and TETRA technology, ETSI standardization, role of TETRA MoU, current operational TETRA equipment and systems, developments with TETRA and the possible future developments in TETRA technology
- Enumerate and differentiate various features and services of TETRA including TETRA technology, voice and data services, bearer services, teleservices and supplementary services
- Explain circuit-switched data, packet switched data, IP packet data and short data service (SDS) as well as apply voice coding, management resourcing, direct mode operation (DMO), support for value added services, spectral efficiency, security aspects, service availability, range of applications for TETRA and TETRA as a PCS
- Determine TETRA architecture covering BS, LSC, MSC, LS, MT, TE, network and standard interfaces, standard gateways, TM air interfaces, ISI, TEI, LSI, NMI, etc
- Discuss the overview of the TETRA air interface including spectrum allocations and channel assignment, physical and logical channels, TDMA structure, medium access control sublayers, etc
- Employ TETRA security and billing in TETRA networks covering authentication, encryption, end to end encryption and billing
- Describe TETRA and public mobile systems pertaining to GSM services and features, convergence of TETRA and GSM, evolution of TETRA towards 3G services and unifying TETRA and UMTS

### **Exclusive Smart Training Kit - H-STK®**



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

### **Who Should Attend**


This course is designed for engineers working for equipment vendors and for network owners who are involved in equipment design, manufacture, network planning, network optimization, strategy determination or deployment of TETRA technology.

### Course Certificate(s)


Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

### Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

### Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.





**Course Instructor(s)**

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



**Dr. Ahmed El-Sayed**, PhD, MSc, BSc, is a **Senior Electrical & Instrumentation Engineer** with **30 years** of extensive experience within the **Oil, Gas, Power, Petroleum, Petrochemical and Utilities** industries. His experience widely covers in the areas of Advanced Distributed Control System (**DCS**), **DCS** Operation & Configuration, **DCS** Troubleshooting, **DCS Yokogawa ProSafe-RS** Safety Instrumented System, **DCS Yokogawa Centum VP**, **DCS Emerson DeltaV**, **DCS GE Mark VI**, Programable Logic Controller (**PLC**), Supervisory Control & Data Acquisition (**SCADA**) Systems, Siemens **PLC Simatic S7-400/S7-300/S7-200**, **Siemens SIMATIC S7** Maintenance & Configuration, **Siemens WINCC**, SCADA System: Siemens **SIMATIC & WinCC**, **Process Control**, **Control Systems & Data Communications**, **Instrumentation**, **Automation**, **Valve Tuning**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), **Telemetry** Systems, **Boiler Control & Instrumentation**, Advanced Process Control (**APC**) Technology, Practical **Fiber-Optics** Technology, **Compressor** Control & Protection, **GE Gas Turbines**, **Alarm** Management Systems, **Engine** Management System, **Fieldbus** Systems, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards** Assessment, **Electrical Equipment**, Electrical Transient Analysis Program (**ETAP**), **Power Quality**, **Power Network**, **Power Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, **Power Electronics**, **Power System** Harmonics, **Power System** Planning, Control & Stability, **Power Flow** Analysis, **Smart Grid & Renewable** Integration, **Power System Protection & Relaying**, Economic Dispatch & Grid Stability Constraints in Power Plants, Electrical Demand Side Management (**DSM**), Electrical **Substations**, **Substation Automation** Systems & Application (IEC 61850), **Distribution Network** System Design, **Distribution Network Load**, Electrical **Distribution** Systems, **Load Forecasting** & System Upgrade (Distribution), **Overhead Power Line** Maintenance & Patrolling, High Voltage **Switching** Operations, Industrial **UPS Systems & Battery** Power Supplies, Electric **Motors & Variable Speed Drives**, **Generator** Maintenance & Troubleshooting, **Generator** Excitation Systems & AVR, **Transformer** Maintenance & Testing, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces and **Earthing & Grounding**, He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution & High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management, Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority**, Egyptian Electricity Holding, Egyptian Refining Company (ERC), **GASCO**, Tahrir Petrochemicals Project, and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Project Coordinator**, **Project Assistant** and **Managing Board Member** where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed has **PhD**, **Master's** & **Bachelor's** degree in **Electrical Engineering** from the **University of Wisconsin Madison, USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, an active member of **IEEE** and **ISA** as well as numerous technical and scientific papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.



**Training Methodology**

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

**Course Fee**

**US\$ 5,500** per Delegate + **VAT**. The rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

**Course Program**

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

**Day 1**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Introduction to TETRA</b> Overview of Trunk Mobile Communications • Trunking Concepts • Benefits of Trunking • Current Trunk Mobile Systems • Overview of iDEN • Overview of Tetrapol • Introduction to TETRA Technology • ETSI Standardization • Role of the TETRA MoU • Current Operational TETRA Systems • Current TETRA Equipment and Systems • Current Developments with TETRA • Possible Future Developments in TETRA Technology
0930 – 0945	Break
0945 – 1100	<b>TETRA Features &amp; Services</b> Features of TETRA Technology • Voice and Data Services • Bearer Services, Teleservices, Supplementary Services • Circuit-Switched Data • Packet Switched Data
1100 – 1230	<b>TETRA Features &amp; Services (cont'd)</b> IP Packet Data • Short Data Service, SDS • Voice Coding • Resource Management • Direct Mode Operation (DMO) • Support for Value Added Services
1230 – 1245	Break
1245 – 1420	<b>TETRA Features &amp; Services (cont'd)</b> Spectral Efficiency • Security Aspects • Service Availability • The Range of Applications for TETRA • TETRA as a PCS
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One



**Day 2**

0730 – 0930	<b>TETRA Architecture</b> BS, LSC, MSC, LS, MT, TE • TETRA Network and Standard Interfaces • TETRA Standard Gateways
0930 – 0945	Break
0945 – 1130	<b>TETRA Architecture (cont'd)</b> TM Air Interfaces • Inter System Interface (ISI) • Terminal Equipment Interface (TEI) • Line Station Interface (LSI)
1130 – 1230	<b>TETRA Architecture (cont'd)</b> Network Management Interface (NMI) • Direct Mode Air Interface • Gateways to Public Networks
1230 – 1245	Break
1245 – 1420	<b>TETRA Architecture (cont'd)</b> Tetra Direct Mode Operation • Gateway Mobile Station • Repeater Station
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

**Day 3**

0730 – 0930	<b>Overview of the TETRA Air Interface</b> Spectrum Allocations and Channel Assignments • Physical and Logical Channels
0930 – 0945	Break
0945 – 1100	<b>Overview of the TETRA Air Interface (cont'd)</b> TDMA Structure • Medium Access Control Sub Layers • Logical Link Control Layer
1100 - 1230	<b>Overview of the TETRA Air Interface (cont'd)</b> Frame, Slot and Burst Structures • Air Interface Message Sets • Idle Mode and Dedicated Mode Procedures
1230 – 1245	Break
1245 – 1420	<b>Overview of the TETRA Air Interface (cont'd)</b> Power Budgets and Range Estimation • Cellular Capacity Issues
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4**

0730 – 0930	<b>TETRA Security &amp; Billing</b> Overview of TETRA Security
0930 – 0945	Break
0945 – 1100	<b>TETRA Security &amp; Billing (cont'd)</b> TETRA Authentication
1100 - 1230	<b>TETRA Security &amp; Billing (cont'd)</b> TETRA Encryption • End-to-End Encryption
1230 – 1245	Break
1245 – 1420	<b>TETRA Security &amp; Billing (cont'd)</b> Billing in TETRA Networks
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four





**Day 5**

0730 – 0930	<b>TETRA &amp; Public Mobile Systems</b> Summary of GSM Services and Features
0930 – 0945	Break
0945 – 1100	<b>TETRA &amp; Public Mobile Systems (cont'd)</b> Comparison of TETRA with GSM
1100 – 1230	<b>TETRA &amp; Public Mobile Systems (cont'd)</b> Convergence of TETRA and GSM
1230 – 1245	Break
1245 – 1345	<b>TETRA &amp; Public Mobile Systems (cont'd)</b> Evolution of TETRA Towards 3G Services • Unifying TETRA and UMTS
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

**Practical Sessions**

This practical and highly-interactive course includes real-life case studies and exercises:-



**Course Coordinator**

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