

**AGENDA PLACEMENT FORM**

(Submission Deadline – Monday, 5:00 PM before Regular Court Meetings)

Date: April 10, 2026

Meeting Date: April 27, 2026

Submitted By: John McKinney

Department: Radio Management

Signature of Elected Official/Department Head:



<b>Court Decision:</b> <small>This section to be completed by County Judge's Office</small>


**Description:**

Request for James Murphy, Radio Technician, to attend a General  
Communications Technician Level 1 (GCT-1) class being conducted May 11, 12  
& 13, 2026 at the City of Denton IT Communications office.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(May attach additional sheets if necessary)

Person to Present: John McKinney

(Presenter must be present for the item unless the item is on the Consent Agenda)

Supporting Documentation: (check one)     PUBLIC     CONFIDENTIAL

(PUBLIC documentation may be made available to the public prior to the Meeting)

Estimated Length of Presentation: < 2 minutes

Session Requested: (check one)

Action Item     Consent     Workshop     Executive     Other \_\_\_\_\_

Check All Departments That Have Been Notified:

County Attorney     IT     Purchasing     Auditor  
 Personnel     Development Services     Facilities Management

Other Department/Official (list) \_\_\_\_\_

**Please List All External Persons Who Need a Copy of Signed Documents  
In Your Submission Email**

## John McKinney

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**From:** owner-publicsafetycomms@ep.nctcog.org on behalf of Marolla, Matthew  
<Matthew.Marolla@cityofdenton.com>  
**Sent:** Monday, March 30, 2026 9:32 AM  
**To:** 'publicsafetycomms@ep.nctcog.org'  
**Cc:** Slaughter, Aaron  
**Subject:** Re: [PUBLICSAFETYCOMMS] GCT-1 Certification Class

**CAUTION: This email originated from outside of the Johnson County email system.  
Use care when opening links or attachments. Report suspicious emails.**

Good morning and Happy Monday,

I wanted to take a minute and thank those of you who have responded and RSVP'd so far.

We have solidified the dates for this and those details are below.

### **GCT-1 & Service Monitor Class**

May 11-13 – GCT 1 \$1500 total + \$105 certification test (per student)

May 14-15 – Service Monitor Class - \$1000 (per student)

Your entity will work out payment directly with the vendor. I understand each of us have our own procurement process so hopefully this is enough time for you to do that.

### **Vendor**

IWA Technical Services, INC.  
7711 Scotia Dr  
Dallas, TX 75248  
844-492-8324

### **INFO**

Where: City of Denton  
When: May 11-15, 2026  
Time: 8:00am-5:00pm

If you need anything else, please don't hesitate to contact me. Also, if you intend on sending any students, please work that out with me so I can have an accurate head count.

Thanks,

**Matt Marolla**  
IT Communications Manager

City of Denton  
601 E Hickory St  
Denton, TX 76209  
**office:** 940-349-7459  
**email:** [matthew.marolla@cityofdenton.com](mailto:matthew.marolla@cityofdenton.com)



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**From:** Marolla, Matthew  
**Sent:** Monday, March 23, 2026 10:28 AM  
**To:** 'publicsafetycomms@ep.nctcog.org' <publicsafetycomms@ep.nctcog.org>  
**Cc:** Marolla, Matthew <matthew.marolla@cityofdenton.com>; Slaughter, Aaron <aaron.slaughter@dps.texas.gov>  
**Subject:** GCT-1 Certification Class

Good morning and Happy Monday!

The City of Denton will be hosting a GCT-1 certification class (3 days) and a Service Monitor class (2 days) in May. We are open to having outside agencies participate at no additional cost for using our facilities.

The cost from the vendor is \$500/day per student. You will pay the vendor directly for each student. I will work with our local hotels if a hotel is needed.

If you are interested, please let me know:

1. Dates you prefer:
  - a. May 4-8, 2026
  - b. May 11-15, 2026
  - c. May 17-22, 2026
2. How many students you would like to send?
3. How many days each student will be participating
  - a. 3 days (GCT-1)
  - b. 5 days (GCT-1 & Service Monitor)

Let me know if you have any questions or need further information.

Thanks,

**Matt Marolla**  
IT Communications Manager

City of Denton  
601 E Hickory St  
Denton, TX 76209  
office: 940-349-7459  
email: [matthew.marolla@cityofdenton.com](mailto:matthew.marolla@cityofdenton.com)





# General Communications Technician - Level 1 (GCT1) Competency Requirements

The General Communications Technician Level 1 certification is a program modeled after general industry communication systems basics and the U.S. Department of Homeland Security (DHS) guidelines covering many of the fundamental disciplines in the COMT program. The purpose of the GCT1 is to provide basic communications electronics knowledge that covers all of the areas a new radio communications technician and/or engineer will encounter in the public safety communications or in the business / commercial radio fields. Please see the [General Communication Technician Level 2](#) competencies for specific in-depth descriptions of communications theories which will involve more complex skills and troubleshooting. The GCT program certifications are maintainable for all Levels.

The following **Level 1** Competency listing is an identification and description of basic individual electronics area subject topics in which an introductory technician is expected to have knowledge in order to prepare for the GCT1 certification examination.

## 1.0 Safety

- 1.1. List basic building / workplace safety protocols per industry standards
- 1.2. Describe general power safety guidelines, including:
  - 1.2.1. battery systems
  - 1.2.2. "Lock Out / Tag Out" rule
  - 1.2.3. grounding and lightning protection safety measures
- 1.3. Describe general tools and equipment safety
- 1.4. List personal protection equipment (PPE) used in the communication fields
- 1.5. Describe "Radio Frequency" (RF) safety
- 1.6. Describe communications safety requirements used near machinery
- 1.7. Describe safety measures used with towers and elevated surfaces
- 1.8. List fiber optic safety requirements
- 1.9. List laser use safety requirements

## 2.0 Electronic and Electrical Theory

- 2.1. Summarize Ohm's law and formulas to include:
  - 2.1.1. voltage
  - 2.1.2. current
  - 2.1.3. resistance
- 2.2. List Watt's law formula including power calculations
- 2.3. Define "Direct Current" (DC)
- 2.4. Define "Alternating Current" (AC)
- 2.5. Explain how and why series circuits are used
- 2.6. Explain how and why parallel circuits are used
- 2.7. Describe decibels (dB) and their use including:
  - 2.7.1. RF- (dBi, dBd, etc)
    - 2.7.1.1. sensitivity
    - 2.7.1.2. gain
  - 2.7.2. power- dBm
    - 2.7.2.1. "Rule of Three"
  - 2.7.3. audio
- 2.8. Describe harmonics applications in communications
- 2.9. Calculate power efficiency
- 2.10. Explain the use of the International System of Units (SI) to include:
  - 2.10.1. the metric system:
    - 2.10.1.1. prefixes and their acronyms
    - 2.10.1.2. scientific notation

## 3.0 Tools and Components

- 3.1. Describe hand tools used in communication fields
- 3.2. Describe power tools used in communication fields
- 3.3. Define components used in communications to include:

- 3.3.1. wire(s)
- 3.3.2. resistors
- 3.3.3. capacitors
- 3.3.4. inductors
- 3.3.5. relays
- 3.3.6. "Solid State Devices" to include:
  - 3.3.6.1. diodes
  - 3.3.6.2. transistors
    - 3.3.6.2.1. bipolar
    - 3.3.6.2.2. field effect (FET)
  - 3.3.6.3. operational amplifiers (op-amps)
  - 3.3.6.4. integrated circuits (ICs)
  - 3.3.6.5. optical devices

#### **4.0 Connectorization**

- 4.1. Describe the requirements for the following types of connections to include:
  - 4.1.1. DC power
  - 4.1.2. AC power
  - 4.1.3. telecom
  - 4.1.4. RF
  - 4.1.5. signaling
- 4.2. List basic wiring fundamentals including:
  - 4.2.1. wire sizing (gauge, American Wire Gauge {AWG})
  - 4.2.2. color code
- 4.3. List standard connector types and functions
- 4.4. Describe standard connector terminations

#### **5.0 Power Systems**

- 5.1. Define "Voltage"
- 5.2. Define "Polarity"
- 5.3. Describe uninterruptible power supply (UPS) systems including AC UPS systems
- 5.4. Describe DC power systems
- 5.5. Describe AC power back-up generators to include:
  - 5.5.1. parameters
  - 5.5.2. uses
  - 5.5.3. operation
- 5.6. Define battery sizing in power systems
- 5.7. Describe renewable energy power systems including:
  - 5.7.1. solar
  - 5.7.2. wind
- 5.8. Describe power distribution
- 5.9. Explain the use of and operation of breakers including:
  - 5.9.1. fuse, sizing
  - 5.9.2. circuit
- 5.10. Describe load centers usage and operation
- 5.11. Define a "Cutoff switch"/ low voltage disconnect (LVD) and its use
- 5.12. Describe an alarm unit and its use
- 5.13. Define transfer boxes

#### **6.0 Radio Frequency (RF) Fundamentals**

- 6.1. Explain basic RF fundamental operating principles and terminology
  - 6.1.1. duty cycle
- 6.2. Explain basic Federal Communications Commission (FCC) rules and regulations pertaining to two-way communications including:
  - 6.2.1. licensing
  - 6.2.2. spectrum usage
- 6.3. Define RF bandwidth
- 6.4. Define propagation to include:

## General Communications Technician Level 1 Knowledge Competencies

- 6.4.1. "Line-of-Sight" (LOS)
- 6.4.2. groundwave
- 6.4.3. "Skywave"
- 6.5. List frequency spectrum band allocations to include:
  - 6.5.1. VLF
  - 6.5.2. LF
  - 6.5.3. MF
  - 6.5.4. VHF:
    - 6.5.4.1. Low band
    - 6.5.4.2. Mid-band
    - 6.5.4.3. High band
    - 6.5.4.4. 220MHz (Ham, Commercial, Positive Train Control {PTC})
  - 6.5.5. UHF:
    - 6.5.5.1. 380-470 MHz (Military, Federal, Ham, Commercial)
    - 6.5.5.2. 470-512 MHz (T-band)
    - 6.5.5.3. 700 MHz (Long Term Evolution {LTE}, Commercial and Public Safety)
    - 6.5.5.4. 800 MHz (Public Safety-Emergency Responders, Cellular, Specialized Mobile Radio {SMR or Trunking})
    - 6.5.5.5. 900 MHz
    - 6.5.5.6. 1.8-1.9 GHz (Broadband Personal Communications Service {PCS})
    - 6.5.5.7. 2.1 GHz (Universal Mobile Telecommunications System {UMTS}, 3G)
    - 6.5.5.8. 2.4 GHz (Industrial, Scientific and Medical)
  - 6.5.6. other frequencies
- 6.6. Explain RF modulation and demodulation to include:
  - 6.6.1. transmitter modulation adds intelligence to the carrier
  - 6.6.2. receiver demodulation
  - 6.6.3. receiver bandwidth must match the transmitter modulation scheme
  - 6.6.4. non-linear modulation, such as C4FM (Continuous 4-level FM) used in P-25
    - 6.6.4.1. H-CPM (Harmonized Continuous Phase Modulation)

## 7.0 Radio Types and Systems

- 7.1. Describe the following radio types:
  - 7.1.1. base
  - 7.1.2. mobile
  - 7.1.3. portable 2-way
  - 7.1.4. paging
    - 7.1.4.1. tone only
    - 7.1.4.2. voice
    - 7.1.4.3. display
  - 7.1.5. repeater
  - 7.1.6. microwave
  - 7.1.7. satellite
- 7.2. Describe the following systems types:
  - 7.2.1. simplex
  - 7.2.2. duplex/half-duplex
  - 7.2.3. conventional
  - 7.2.4. microwave
  - 7.2.5. repeater
  - 7.2.6. internet protocol (IP)
  - 7.2.7. wireless network technology (Wi-Fi®), 2.4 GHz
- 7.3. Describe basic radio components to include:
  - 7.3.1. transmitter(s)
  - 7.3.2. receiver(s), selectivity
  - 7.3.3. power supplies
  - 7.3.4. audio and control
  - 7.3.5. user programmable parameters

## 8.0 Antennas

- 8.1. Define polarization plane = vertical or horizontal
- 8.2. Describe antenna wavelength and how it is used
- 8.3. Define resonance
- 8.4. Define bandwidth
- 8.5. Define beamwidth
- 8.6. Explain 3dB points
- 8.7. Describe gain
- 8.8. Describe "YAGI"
  - 8.8.1. Identify elements
  - 8.8.2. Identify front-to-back ratio
- 8.9. Describe antenna match to include defining standing wave ratio (SWR)
- 8.10. Describe measurements including:
  - 8.10.1. power
  - 8.10.2. return loss
  - 8.10.3. "Distance-to-Fault"
- 8.11. Describe antenna downtilt
- 8.12. Explain the importance of using drain holes
- 8.13. Describe a "Balun" antenna
- 8.14. List antenna types and azimuth to include:
  - 8.14.1. omnidirectional
  - 8.14.2. uni-directional
  - 8.14.3. specialized

## 9.0 Transmission Lines

- 9.1. Describe transmission line power
- 9.2. Explain characteristic impedance
- 9.3. Describe transmission line frequency
- 9.4. Explain line length
- 9.5. Describe line weight
- 9.6. Describe cable size/diameter (gauge)
- 9.7. Describe line outer covering material
- 9.8. Define the importance of shielding percentage
- 9.9. Describe the importance of line bend radius rules
- 9.10. Explain line RF signal loss, attenuation
- 9.11. List cable types used in communications

## 10.0 Interference

- 10.1. Define RF interference including:
  - 10.1.1. natural
  - 10.1.2. man-made
- 10.2. Describe co-channel interference
- 10.3. Describe adjacent channel interference
- 10.4. List interference protective devices
- 10.5. Describe common mitigation steps to help resolve interference

## 11.0 Data Networks

- 11.1. Define the "Open Systems Interconnect" (OSI) model
- 11.2. Define serial data to include:
  - 11.2.1. RS232 standard pin out
  - 11.2.2. Universal Serial Bus (USB) standard devices
  - 11.2.3. data communication environment (DCE)
  - 11.2.4. data terminal equipment (DTE)
- 11.3. Describe internet protocol (IP) to include:
  - 11.3.1. wireless
  - 11.3.2. protocols
  - 11.3.3. cables

## 12.0 Fiber Optic Systems

- 12.1. Describe basic fiber optic cable fundamentals and terminology
- 12.2. Define fiber optic modes including:
  - 12.2.1. Single-mode (9  $\mu\text{m}$  /125) ( $\mu\text{m}$  = micron)
  - 12.2.2. Multimode (50 or 62.5  $\mu\text{m}$  /125)
- 12.3. Describe fiber optic wavelengths including:
  - 12.3.1. 850 nanometers (nm)
  - 12.3.2. 1310 nm
  - 12.3.3. 1550 nm
- 12.4. List common fiber optic connectors

## 13.0 Test Equipment and Methods

- 13.1. Describe the use and operation of the following meters:
  - 13.1.1. volt meter(s)
  - 13.1.2. ammeter(s)
  - 13.1.3. wattmeter(s)
  - 13.1.4. optical power meter(s)
- 13.2. Define dummy load; show where and why used
- 13.3. Describe the value of "Communication Service Monitors" (CSM)
- 13.4. Describe the use and operation of system analyzers including:
  - 13.4.1. oscilloscope
  - 13.4.2. spectrum analyzer
  - 13.4.3. "Frequency Domain Reflectometer" (FDR)
  - 13.4.4. "Time Domain Reflectometer" (TDR)
- 13.5. Describe the use and operation of audio transmission test sets to include:
  - 13.5.1. "Transmission Impairment Measurement Sets" (TIMS)
- 13.6. Explain the use and operation of a lineman's handset ("Butt-Sets")
- 13.7. Explain the use of a ground resistance tester
- 13.8. Explain "Equipment Testing" best practices to include:
  - 13.8.1. calibration
  - 13.8.2. stabilization
  - 13.8.3. warm-up procedures
  - 13.8.4. test lead loss compensation
  - 13.8.5. pass/fail limits for tolerances
- 13.9. Describe appropriate "Lock Out / Tag Out" procedures to be applied before testing and troubleshooting

## 14.0 Telephony Communications

- 14.1. Describe telephony basics to include:
  - 14.1.1. incumbent local exchange carrier (ILEC)
  - 14.1.2. plain old telephone service – voice (POTS)
- 14.2. Describe public switched telephone networks (PSTN)
- 14.3. Describe private line telephone networks (PL)
- 14.4. Identify telephone circuit types
  - 14.4.1. 2-wire
  - 14.4.2. 4-wire
- 14.5. Define "Loopback" and loopback testing
- 14.6. Describe a "Channel Service Unit" (CSU)
  - 14.6.1. Explain CSU/Data Service Unit (DSU) functions

## 15.0 Satellite Communications

- 15.1. Define "Low Earth Orbit" (LEO) satellites
- 15.2. Describe why "Satellite Mutual Aid Radio Talk" groups (SMART) was formed
- 15.3. Define Broadband Global Area Network (BGAN)
- 15.4. Explain Global Positioning System (GPS)
  - 15.4.1. Define Position, Navigation and Timing (PNT)
- 15.5. Identify a satellite antenna alignment set-up

## 16.0 Environmental Systems

- 16.1. Describe fire suppression systems
- 16.2. Describe "Heating, Ventilation, Air Conditioning" (HVAC) systems affecting communications
- 16.3. List how lighting systems affect communications sites
- 16.4. Describe how vermin affect communication environments

## 17.0 Physical Plant / Head End and Security Systems

- 17.1. Describe the function of access systems / locks for a communications site
- 17.2. List cybersecurity systems awareness
- 17.3. Describe battery usage to include:
  - 17.3.1. types
  - 17.3.2. recharging
  - 17.3.3. Proper Sizing
  - 17.3.4. configuration
    - 17.3.4.1. series
    - 17.3.4.2. parallel

## End of General Communications Technician - Level 1 Competencies Listing

Find an ETA® Test Site

[https://www.etai.org/test\\_sites.html](https://www.etai.org/test_sites.html)

### Additional Suggested Study Materials and Resources:

**General Communications Technician, Level 1, 2Ed.**; Ira Wiesenfeld, P.E., CETsr, Rob Walker, LAS, PIM, Jay Thompson, CETsr, A.J. Wiesenfeld, BSEE, LAS; ISBN 978-0-9915913-5-0; Self Published; 2015; softcover. Contact ETA® International at 800-288-3824 or [eta@etai.org](mailto:eta@etai.org)

**Modern Electronic Communication, 9E**; Jeff Beasley, Gary Miller, ISBN 978-0-13225113-6; Prentice Hall; 2007; hardcover.

**Wiring for Wireless Sites**; Ira Wiesenfeld, P.E., CETsr, ISBN 978-1-40181037-5; Prompt; 2002; softcover. Contact ETA® International at 800-288-3824 or [eta@etai.org](mailto:eta@etai.org)

**ARRL Handbook, 2021 (Annual)**; Numerous Authors; ISBN 978-1-62595-139-7; The American Radio Relay League, Inc.; 2021

**Practical Antenna Handbook, 5E**; Carr, Hippisley; ISBN 978-0071639583; McGraw-Hill; 2011

**New HAM Radio License? Now What?**; James Sanders, AG6IF; Kindle Edition; Amazon; 2014

<https://www.dhs.gov/keywords/communications> & [Emergency Communications](#) & [Office of Emergency Communications](#) & [SAFECOM](#) & [Project 25 Resources and Information | Homeland Security](#)

<https://www.iwatsi.com/> & <https://www.iwa-radio.com/>; <https://www.electronics-notes.com/articles/radio/>;

<https://www.fcc.gov/commercial-radio-operator-license-program>; <https://us-cert.cisa.gov/ncas/tips/ST04-001>;

<https://www.tacticalrf.com/>; [APCO Project 25](#); <https://www.iwceexpo.com/> & <http://urgentcomm.com/>;

[RadioReference.com Wiki Reference](#); <http://www.rcrwireless.com/>; <http://www.radioresourcemag.com/>;

<https://www.dovertrainingsolutions.com/>;

**GCT - Certification Program Subject Matter Advisory Board:**

Ira M. Wiesenfeld, P.E., CETms(RF)	IWA Technical Services.; (TX)	<a href="mailto:iwiesenfel@aol.com">iwiesenfel@aol.com</a>
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Chris L. Dalton, LAS	RSA, Inc.; (VA)	
John D. MacLean, CET	DHS; (TN)	
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Tom Dover	DTS, Inc; (UT)	<a href="mailto:tom@doverts.com">tom@doverts.com</a>
Merle Taylor, RFIM	Rockinmesquite; (TX)	
Dr. Ron Milione, CETma	PSEG; (NY)	
Daniel Newman, CET	BCSR; (CA)	
Don Root, Jr	SDS; (CA)	
Larry Schaeffer	USCP; (DC)	
Paul Gilbert, CET	TX DOT; (TX)	<a href="mailto:ke5zw@wt.net">ke5zw@wt.net</a>
Michael Green, CET	ESPN; (CT)	
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Mike S. Hare, CETms	CofB; (TX)	
Aaron J. Brandt, CET	CofR; (CA)	
Steven A. Powell, CET	CofR; (CA)	
Michael Olson, GCT1	USA; (TX)	<a href="mailto:kb6jyf@gmail.com">kb6jyf@gmail.com</a>
D. Marty Burnham	ECTC; (OH)	
Dane Brockmiller, LAS, PIM, DAS	dBc; (AR)	
Bill Dow	Westell; (NY)	
Bryan S. Detro, CETsr	Motorola Solutions; (FL)	<a href="mailto:bryan.detro@motorolasolutions.com">bryan.detro@motorolasolutions.com</a>
Joseph Delio, CETma, CETms(RF)	IWATSI; (OH)	
Christopher Miller, CETsr	Heartland CC; (IL)	
Matt Lunati, CETms	Combined Wireless; (AZ)	
Dr. William Bailey, Jr	ETA; (SC)	
Christopher Cisco, CETsr	Bearcom; (TX)	

Remember those who led the way and gave their best content for other technicians to perceive in competency.

**ETA certification programs are accredited through ICAC,  
complying with the ISO/IEC 17024 standard.**

