

# Gwinnett County Amateur Radio Emergency Service



## Packet Radio Primer (PKT 100)

Prepared by Stan Edwards, WA4DYD, CEM  
Assistant Emergency Coordinator for Training

# Agenda

- What is Packet?
- A Little History
- How does it work?
- Why the packet client?
- What about Winlink?

# What Is Packet?

- Digital mode
- Uses AX.25 protocol
- Enhancements included networking using:
  - Digipeaters
  - TheNet (SEDAN)
  - NET/ROM
  - KA-Node (Kantronics)
  - Rose
  - TCP/IP
- Use on any frequency band where permitted

# A Little AX.25 History

- First widely used protocol based on IBM SDLC from Vancouver Amateur Digital Communications Group.
- Early 1982 AMRAD recommended use of slightly modified CCITT X.25 protocol standard.
- In June 1982, a series of meetings was held by AMRAD and RATS of NJ at AT&T that decided to call the new protocol Amateur X.25 or AX.25.
- In October 1982, AMSAT hosted a meeting of leaders in packet activity and a slightly modified version 1.1 AX.25 protocol was adopted.

# A Little AX.25 History

- Shortly after, the TAPR TNC board integrated the AX.25 protocol and soon after the VADCG board was modified for AX.25.
- The first public release of the AX.25 protocol was in a paper given at the Second Amateur Radio Computer Networking Conference in March 1983.
- The WESTNET group extended the AX.25 protocol to accommodate up to eight repeaters and was accepted by the ARRL committee in November 1983.

# A Little AX.25 History

- ARRL Committee met again in April 1984 and resolved a final issue and the results were published in QEX and other packet publications.
- Version 2.0 of the protocol was finalized and approved for submission to the ARRL Board of Directors by the Ad Hoc Committee on Digital Communications and received final approval in October 1984.

# The AX.25 Protocol

- Follows, in principle, CCITT X.25 Recommendation
- Adds an extended address field and addition of the Unnumbered Information (UI) frame.
- Follows the principles of CCITT Recommendation Q.921 (LAPD) in the use of multiple links, distinguished by the address field, on a single shared channel

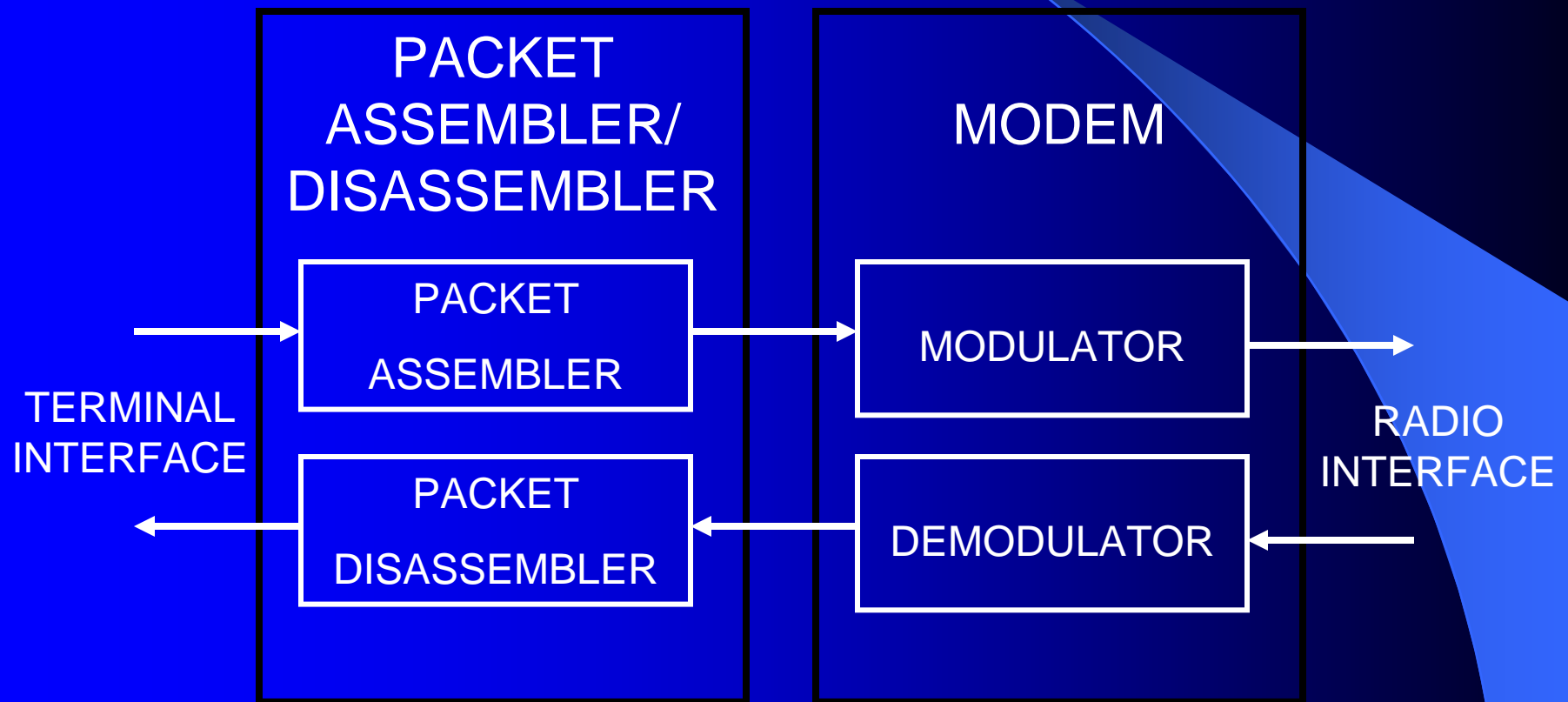
# The AX.25 Protocol

- Works equally well in either full or half-duplex operation
- Designed to work equally well for direct connections between two individual stations or an individual station to a multiport controller
- Allows establishment of more than one link-layer connection per device
- Permits self-connection

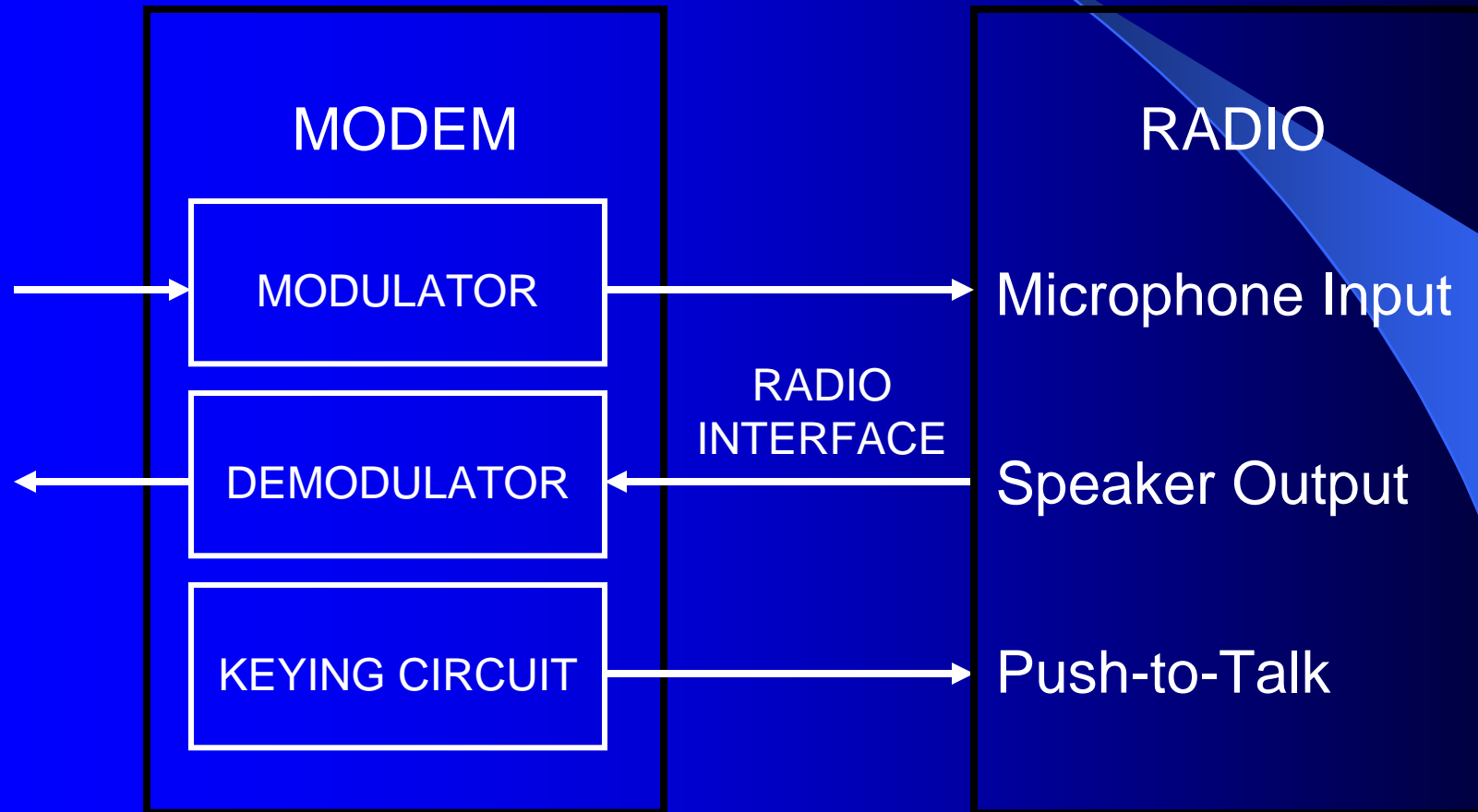
# Terminal Node Controller

- Commonly called a TNC
- Provides both a packet assembler-disassembler (PAD) and modem in one device
- Typically includes a microprocessor and memory
- May include a mailbox
- New TNCs may include other digital modes including weather FAX and photo modes, slow scan TV, HF modes, etc. called multimode controllers

# A TNC Functional Diagram



# Radio Connection



# TNC Configuration

- Many options for TNC operation
- Options vary by manufacturer
- May include more common:
  - Echo (off)
  - AutoLF (off)
  - Beacon After (0)
  - Beacon Every (0)
  - Txd (100)
  - Retry (2)

# TNC Commands

- Standardized in terms of TNC2 structure
- Includes:
  - Connect: c (c wa4dyd-1)
  - Via: v (c wa4dyd-1 v lvl)
  - Disconnect: dis
  - MHeard: mh
  - Monitor: mon (mon on / mon off)

# Current Network

- 145.03 (Standard Packet LAN)
  - LAW/WX4NET-7: Lawrenceville
  - SNL/WX4NET-8: Snellville
  - BUF/WX4NET-6: Buford
- 145.77 (SEDAN)
  - LVL/W4GR: Lawrenceville Water Tank
  - JASP/N3DAB
- 144.39 (APRS)

# Winlink 2000

- Uses standard email client for user interface
- Can use all functions of email client, including attachments
- Address scheme based on call@winlink.org
- Can establish local “post office”
- Client periodically polls node to see if mail present for client

# Emergency Service Packet Client

- Uses standard ARRL message formats
- Supports ICS message format
- Uses “push” technique to send messages to destination
- Server provides list of registered stations
- Can connect using alias if using certain configuration (AGWPE)

# References

- *Practical Packet Radio*, Stan Horzepa, WA1LOU, ARRL, 1995-1998
- *AX.25 Amateur Packet-Radio Link-Layer Protocol, Version 2.0 October 1984*, Terry L. Fox, WB4JFI, ARRL, 1984

