GPS-Enabled Software for Mobile Contest Operation
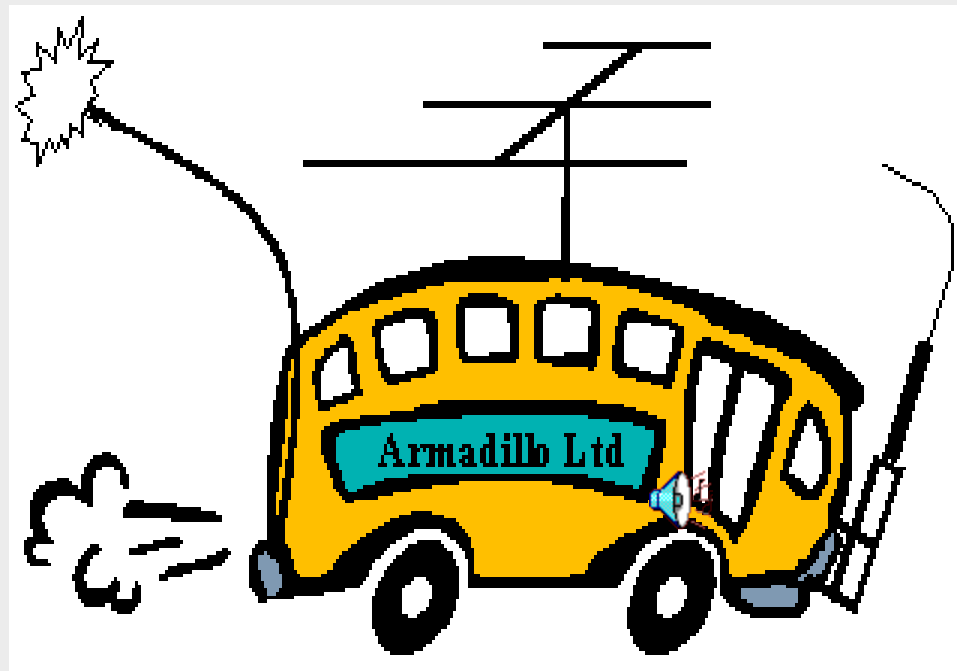

Texas DX Society

August 13, 2009

A group of party goers returning from a TQP weekend mobile run!

Two Main Topics

- ## The Texas QSO Party
  - What and when it is
  - What you need to operate in the TQP
  - Operating Categories
  - Past activity levels – including rare counties
  - How to obtain more information

- ## GPS-Enabled Software for Mobile Operation
  - Demo Trip Using the GPS Simulator
  - Info for the mobile QSO party operator
  - Automatic County Detection
  - How to make QSOs
  - How to obtain more information
  - Software availability

Audience Survey – How Many

- Operate contests on a regular basis?
- Have operated TQP in last 3 years?
- Have HF mobile capability?

- Have a GPS?
- Have used a GPS in a QSO party?

The Texas QSO Party

- **On September 26-27**
  - All antennas and operators will be focused on working **Texas** stations
  - Texans can work anyone, including other Texans
  - Non-Texans may only work Texans
  - Goal of **non-Texas** stations is to work at least one station in each **Texas** county
  - Goal of the **Texas** stations is to put each of the 254 Texas counties on the air
  - **Texas** mobiles can be reworked each time they change county

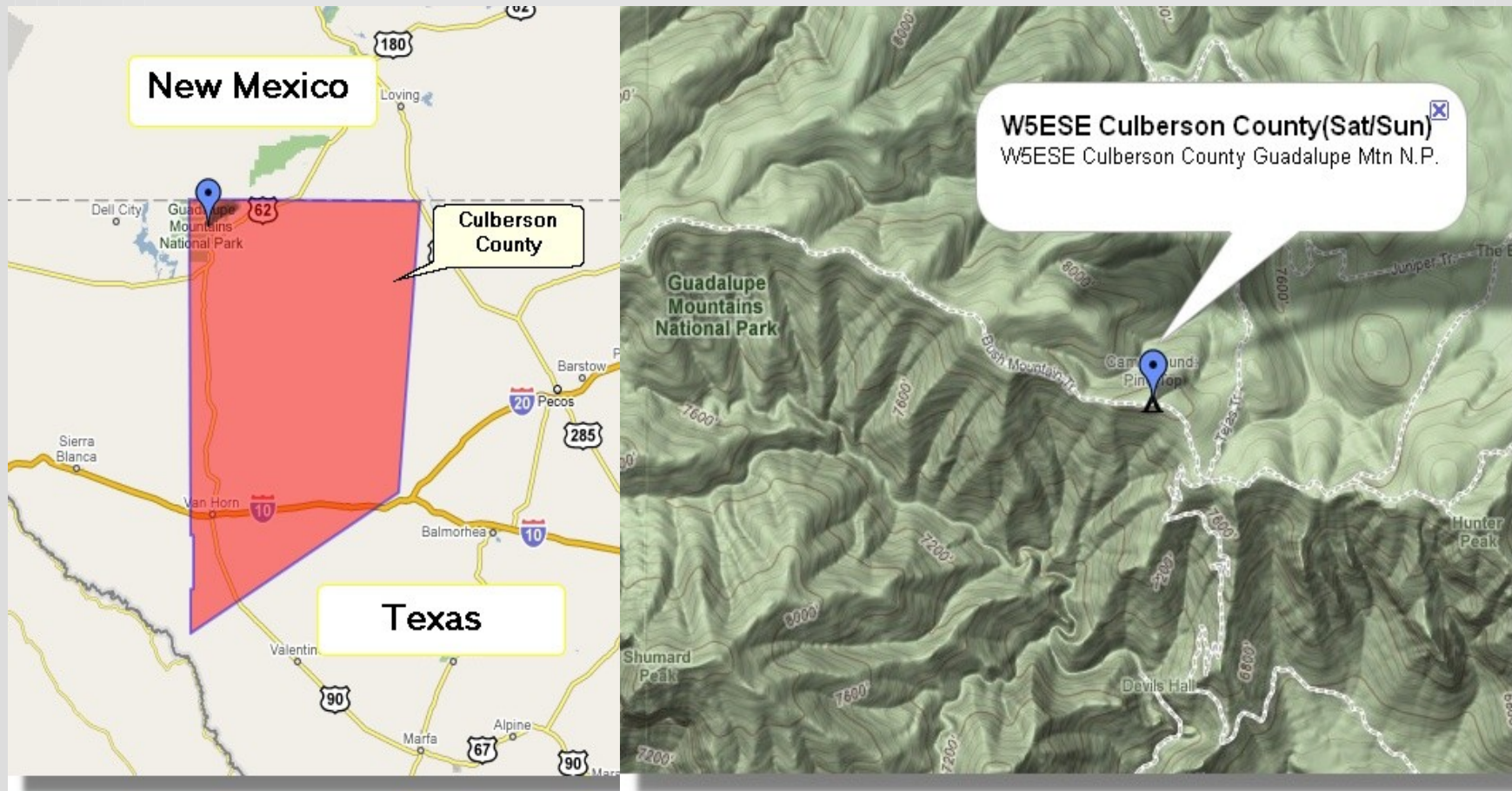In the 2008 TQP N4PN worked 195 of the 254 counties

NO5W

Ways of Operating the TQP

- Stay home, operate as a fixed station?

- Take a hike, operate as a fixed station?

- Have a club picnic and operate Field Day style?

- Take a road trip through Texas as a mobile?

NO5W

Scott backpacked in the Guadalupe N.P, set up camp at one of the highest points in Texas, and was the only station on from Culbertson county, and made 100+ QSOs using ….

W5ESE

AT Sprint 3
3 Watts

QRP

Scott McMullen 205 Stirrup Drive Dripping Springs TX 78620 USA   Hays County · EM00

Take a Road Trip – See Some Scenery

W5ZL – backseat operator in the K5NA Burrito-mobile

Officer Robles treated the Burrito Bothers with compassion.
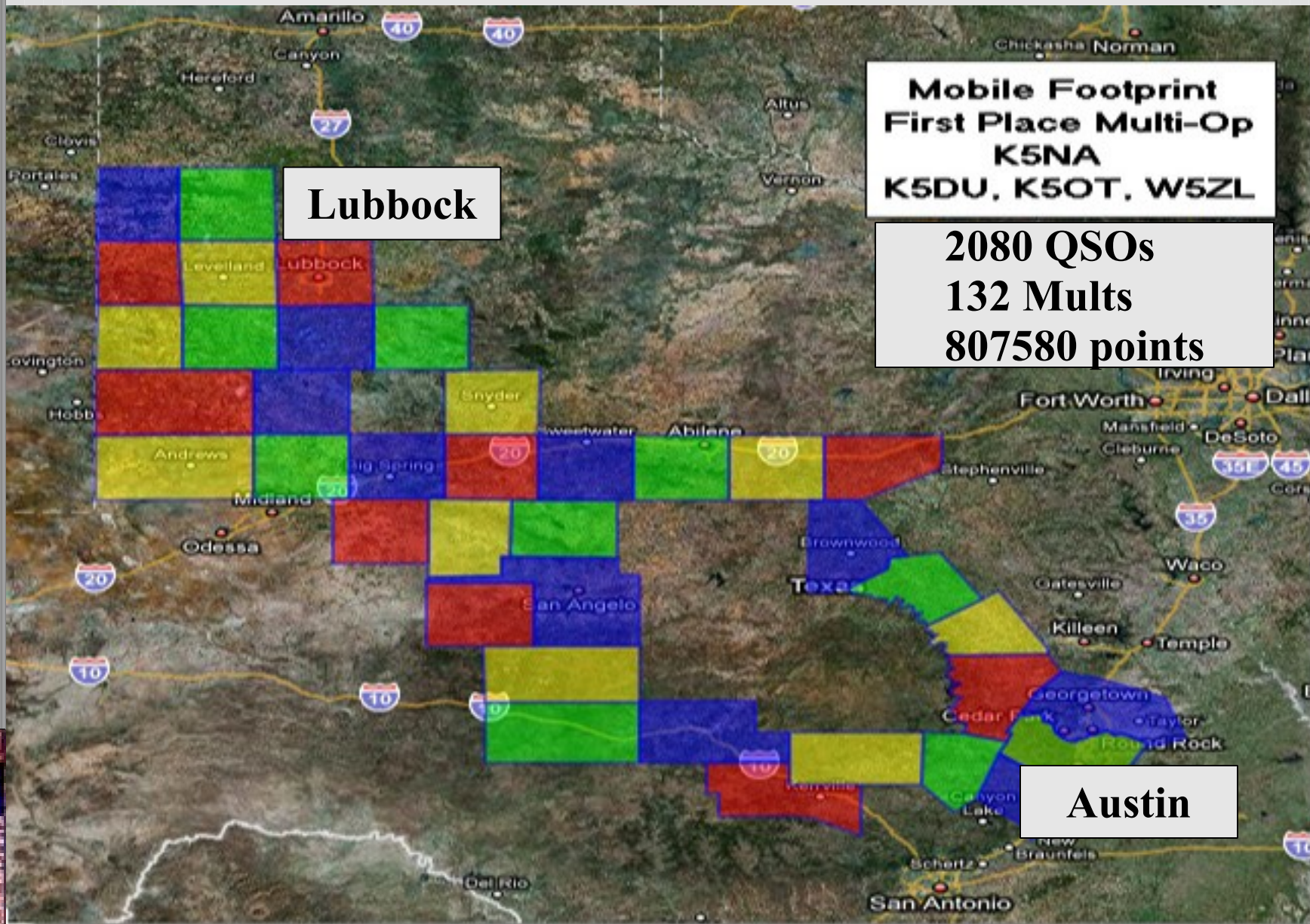
Texas DX Society – August 13, 2009

NO5W

NO5W

The Burrito Brothers take a break after a long day in the Tahoe

Texas DX Society – August 13, 2009

NO5W

- **First Session - September 26**
  - The party starts at 1400 UTC
  - The party suspends at 0200 UTC
- **Second Session – September 27**
  - The party resumes at 1400 UTC
  - The party ends at 2000 UTC

A total of 18 hours, 12 hours on Saturday, 6 hours on Sunday

Where's the TQP Held?

- **Bands: You may operate on all ham bands**
  - Except 60M, 30M, 17M, 12M
- **Modes: You may operate on**
  - CW/SSB/RTTY and other digital modes
  - Of course some categories are CW only
- **Repeater contacts: Do not count**

As a practical matter most activity is on 20M and 40M phone and CW

The QSO Exchange On Phone

- NO5W
  - **CQ TEXAS CQ TEXAS**
  - **November Oscar 5 Whiskey CQ TEXAS**
- K4BAI
  - **K4BAI**
- NO5W
  - **K4BAI 59 FORT BEND FOXTROT-BAKER-EASY-NANCY**
- K4BAI
  - **QSL YOUR 59 GOLF ALPHA GEORGIA**
- NO5W
  - **THANKS JOHN AND GOOD LUCK IN THE CONTEST**
  - **NOVEMBER OSCAR 5 WHISKEY CQ TEXAS**

Its important to log the TQP official abbreviation for your county. You can find these on the TQP website

TQP Operating Categories

NO5W

- **Fixed Operation Categories (TX/non TX)**
  - Single Operator
  - Multi Operator
  - QRP Single Operator
  - CW Only Single Operator
- **Mobile Operation Categories**
  - Texas Mobile Single Operator
  - Texas Mobile Multi Operator
  - Texas Mobile Single Operator CW Only

The only power categories are QRP and Other.
There are no separate categories for low and high power

Awards

- In each category
  - **First place** sponsored plaque or certificate
  - **Second place** sponsored plaque or certificate
  - **Third place** sponsored plaque or certificate
- All first and second place plaques have sponsors
- Six third place plaques do not have sponsors
- You and/or your club can sponsor a 3rd place plaque for $14.50.
- contact no5w@consolidated.net

Winner receives plaque if one has been sponsored
Otherwise winner receives a certificate with the option to purchase the plaque.

Texas Award Winners - 2008

Category	Call	Operator	QSO/Mults	Score	Plaque sponsor
1. TX SO	N5DO	Dave Cockrum	1434/204	662932	CTDXCC
2. TX SO	N5JB	John Barber	1012/142	320852	Certificate
3. TX SO	W5RQ	John McColly	1053/110	254650	Certificate
1. TX MO	NX5M	Bob Pack [1]	2832/226	1396428	Gary Schmidt - W5ZL
2. TX MO	WC5C	Tri-County ARC[2]	463/102	116892	Certificate
3. TX MO	WD5DDH	Ellis County ARC	418/97	82092	Certificate
1. TX QRP SO	W5ESE	Scott McMullen	108/69	23356	Austin QRP Club
2. TX QRP SO	WB5BKL	Cranz Nichols	83/43	10707	Williamson County ARC
3. TX QRP SO	No entry	---	---	---	---
1. TX SO CWO	K5LH	Eric Rust	350/109	119950	Heart of TX DX Society
2. TX SO CWO	NT5O	Hugh Brown	324/107	105004	Williamson County ARC
3. TX SO CWO	WD5EAE	Steve Genusa	333/100	99900	Certificate
1. TXM SO	W0BH	Bob Harder	1479/106	470720	SW Dallas County ARC
2. TXM SO	WW5X	Bill Wells	1330/93	352265	Chuck Sanders - NO5W
3. TXM SO	N5UV	David Lusk	1650/93	341900	Chuck Sanders - NO5W
1. TXM MO	K5NA	Richard King [3]	2080/132	807580	Mike Bragassa - K5UO
2. TXM MO	KB5U	Chris McKee	650/103	171503	Chuck Sanders - NO5W
3. TXM MO	KE5MS	Matt Stouffer [4]	557/47	94537	Certificate
1. TXM SO CWO	K5UN	Lee Laird	933/95	297715	CTDXCC
2. TXM SO CWO	W3DYA	Norm Beavers	873/86	252734	Certificate
3. TXM SO CWO	NO5W	Chuck Sanders	970/70	237200	Certificate

Multi-Ops 1. NX5M, KU5B, N5XJ, KJ5T   2. KB5YLG, KC5SLQ, KE5SCG, KE5TQM, N5GMJ, N5WLA
Multi-Ops 3. K5NA, K5DU, K5OT, W5ZL   4. N5BE, KE5MS

Plaque Sponsors - 2009

Category	Plaque Sponsor
1. TX Single Op	CTDXCC
2. TX Single Op	CTDXCC
3. TX Single Op	Ken Harlan - KA5AKG
1. TX Multi-Op	Gary Schmidt - W5ZL
2. TX Multi-Op	CTDXCC
3. TX Multi-Op	
1. TX QRP Single Op	Austin QRP Club
2. TX QRP Single Op	Williamson County ARC
3. TX QRP Single Op	Doug Loughmiller - W5BL
1. TX SO CW Only	Heart of Texas DX Society
2. TX SO CW Only	Williamson County ARC
3. TX SO CW Only	
1. TXM Single Op	SW Dallas County ARC
2. TXM Single Op	Marty Fitzgerald - W5MF
3. TXM Single Op	Brazos Valley ARC-BVARC
1. TXM Multi-Op	Mike Bragassa - K5UO
2. TXM Multi-Op	Brazos Valley ARC-BVARC
3. TXM Multi-Op	
1. TXM SO CW Only	CTDXCC
2. TXM SO CW Only	Jay Sewell - W5SL
3. TXM SO CW Only	

Category	Plaque sponsor
1. Non-TX SO	CTDXCC
2. Non-TX SO	Tom Atkins - KD5EIJ
3. Non-TX SO	
1. Non-TX QRP SO	Dale Martin – KG5U
2. Non-TX QRP SO	Doug Loughmiller - W5BL
3. Non-TX QRP SO	Doug Loughmiller - W5BL
1. Non-TX CWO SO	Norm Beavers – W3DYA
2. Non-TX CWO SO	Larry Kendall - K5END
3. Non-TX CWO SO	
1. DX SO	Larry Hammel - K5OT
2. DX SO	CTDXCC
3. DX SO	Ruff Hance - K9SEX

TX Club Plaques

Category	Plaque Sponsor
1. TX Club Aggregate	Townsends - K5CX/N5AOK
2. TX Club Aggregate	Keith Dutson - NM5G
3. TX Club Aggregate	Joe Sokolowski - KD5KR

* As of August 6, 2009

Texas Club Aggregate Competition

- Open to all Texas Amateur Radio Clubs
- Logs submitted for each club are totaled and the club with the most points wins a traveling club trophy and a non-traveling plaque
- Be sure to indicate on your log which club should receive credit for your points
- Trophy presentation takes place at Hamcom

In 2008 the top three clubs were
1. Central Texas DX and Contest Club – Austin area
2. DX and Contest Club – KW5DX Dallas area
3. Northwest ARS – Houston area

NO5W
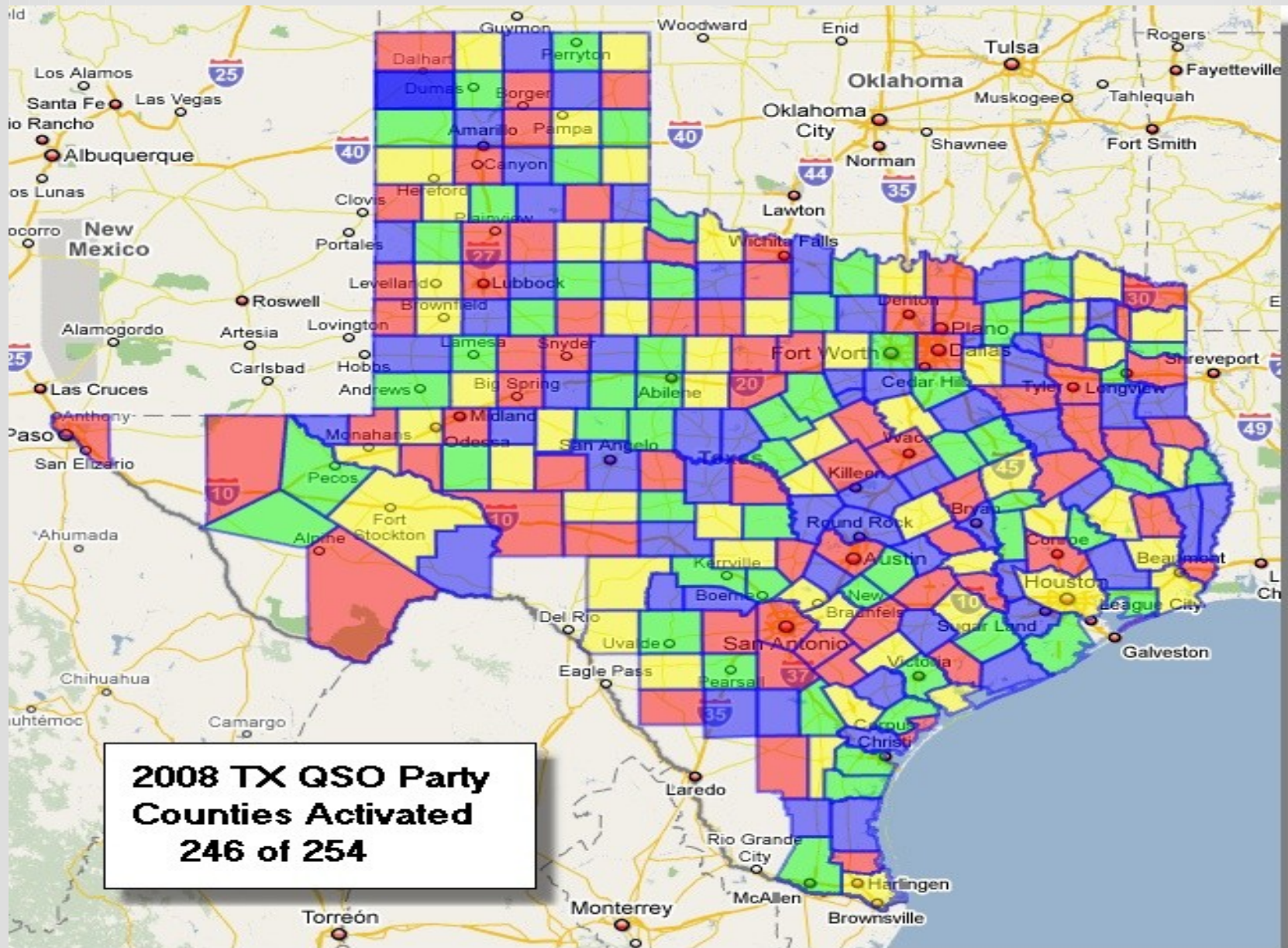
Club Trophy Presentation - HamCom

Logging

- Electronic logs are very much preferred
- Paper logs are accepted
- All logs should include
  - Date, Time, Mode, Frequency or band
  - Signal reports sent and received
  - QTH of both stations
    - County for Texas stations
    - State/province/country for others
  - Call sign of both stations
- Email Logs
  - Should be sent to no5w@consolidated.net
  - Should be sent no later than October 31, 2009
  - Should include call sign and TQP in the subject line
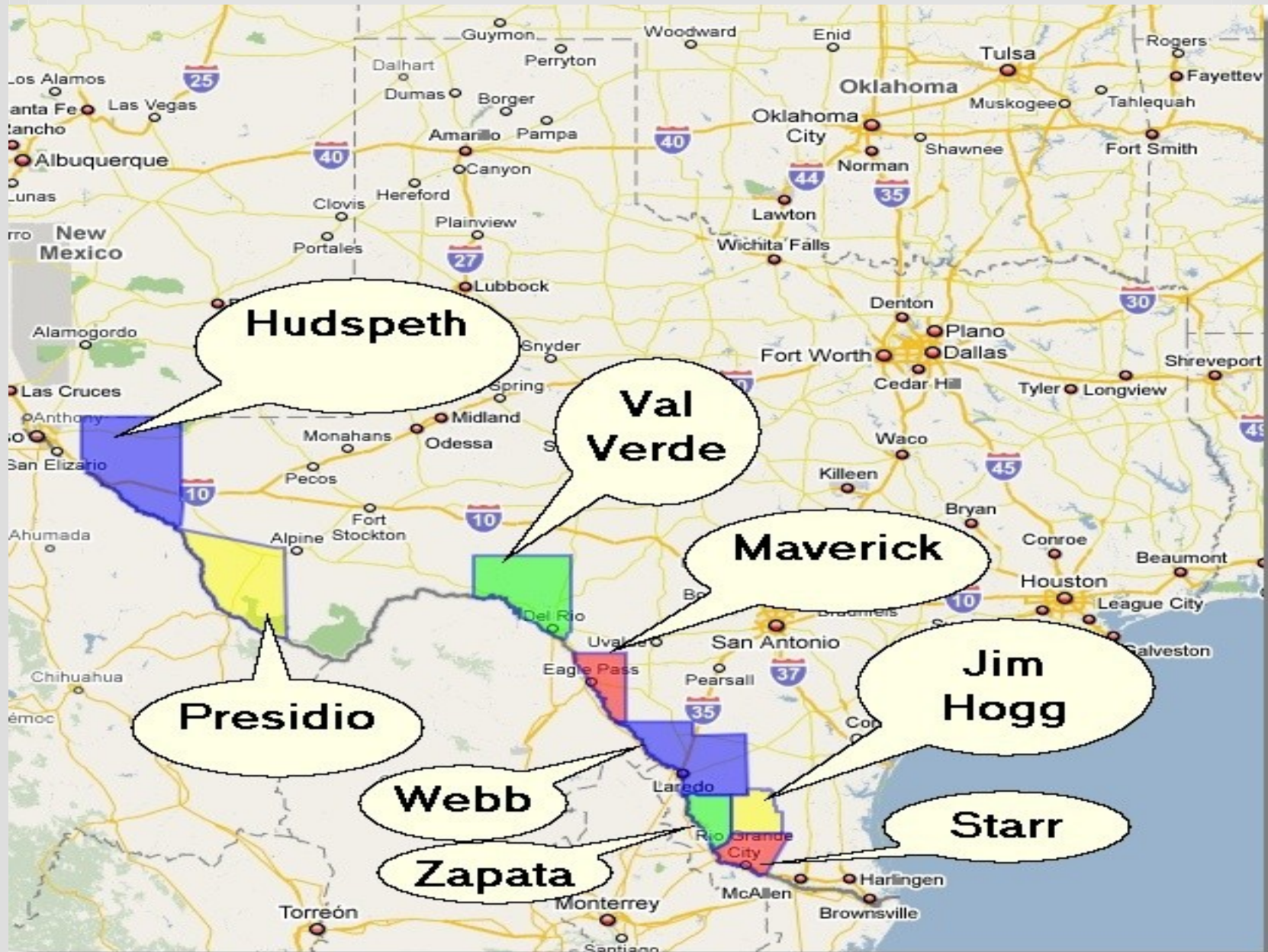
Be kind to your log checkers and submit electronically!

NO5W

Activated Counties - 2008

2008 TX QSO Party
Counties Activated
246 of 254

The Eight Inactive Counties - 2008

Texas DX Society – August 13, 2009

Activity from Harris County in 2008

- NO5W/M – Chuck, The Woodlands, TX
- KB6OJE/M – Jerry Keltner, Duncanville, TX
- N5BIA – Bill Buoy, Houston, TX
- N5EN – Steve Niles, Houston, TX
- W5MF – Marty Fitzgerald, Houston, TX
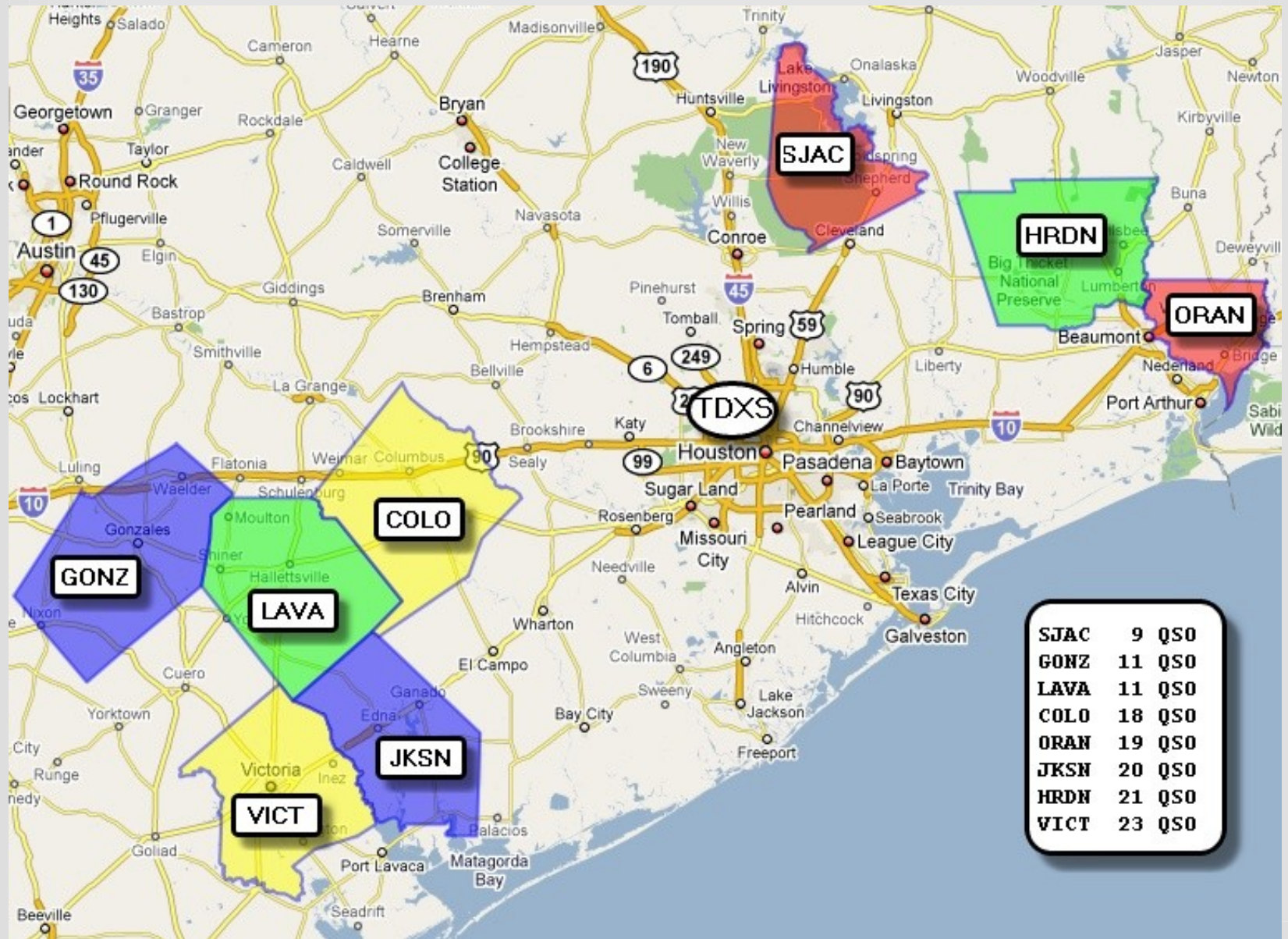- K5SEE – John Holliman, Houston, TX

Total of 1090 QSOs (531 PH, 559 CW)

Within 100 Mile Radius of Meeting

- There are 38 counties
- The least active of these in 2008 was San Jacinto with one active station, a mobile, making 9 QSOs
- In 2007 San Jacinto was not activated
- The next least active counties were Gonzales and Lavaca each having one active station and making 11 QSOs
- Colorado, Orange, Jackson, Hardin, and Victoria each had one active station and fewer than 25 QSOs

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Low Activity Counties Within 100 Mile Radius of TDXS Meeting

Texas DX Society – August 13, 2009

NO5W

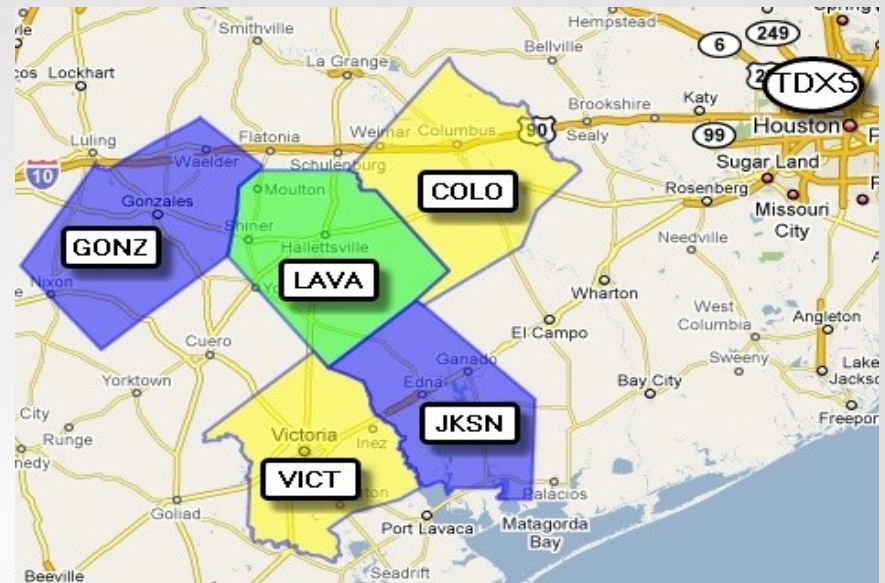|		
SJAC	9	QSO
GONZ	11	QSO
LAVA	11	QSO
COLO	18	QSO
ORAN	19	QSO
JKSN	20	QSO
HRDN	21	QSO
VICT	23	QSO

A Possible Strategy

- Saturday
  - Jackson
    - Victoria
    - Lavaca
    - Gonzales
  - Colorado
  - Others along the way
- Sunday
  - San Jacinto
  - Hardin
    - Orange
  - Others along the way

W5NC
Houston, Texas
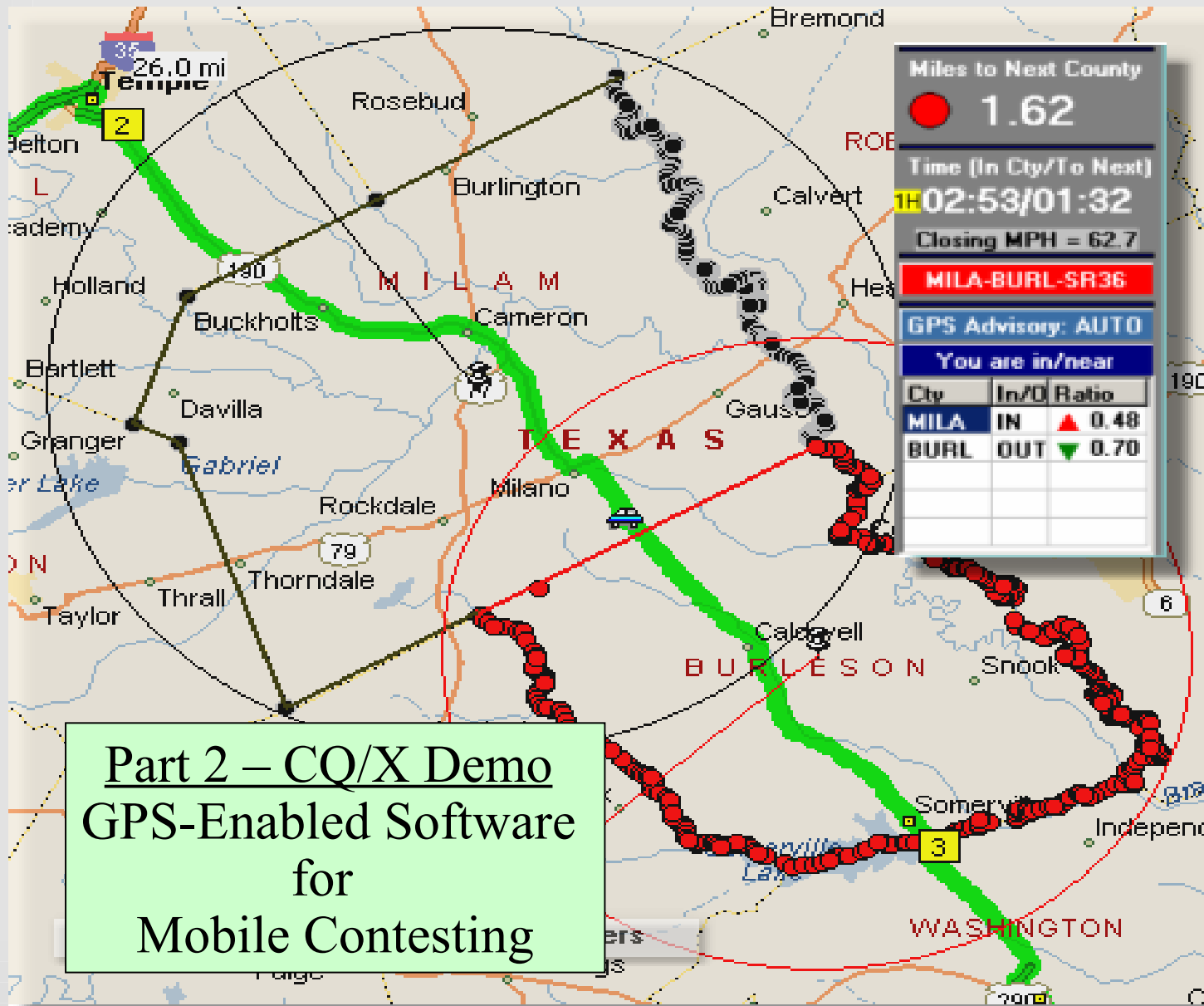Northwest Amateur Radio Society

Texas QSO Party

Join in the fun on September 26-27, 2009
See www.txqp.net for the rules of engagement
or contact the TQP Coordinator

**TQP Coordinator
C.W. Sanders – NO5W
The Woodlands, TX
no5w@consolidated.net**

Arnadilo Ltd

www.txqp.net

NO5W

Texas DX Society – August 13, 2009

Miles to Next County
● 1.62

Time (In Cty/To Next)
1H 02:53/01:32

Closing MPH = 62.7

MILA-BURL-SR36

GPS Advisory: AUTO

You are in/near

Cty	In/O	Ratio
MILA	IN	▲ 0.48
BURL	OUT	▼ 0.70

Part 2 – CQ/X Demo
GPS-Enabled Software
for
Mobile Contesting

CQ/X de NO5W

- Originally designed for TQP

- Now supports 28 State/Regional QSO Parties involving 39 states

- Includes boundary models for about 2200 counties

- Automatically detects what county you're in from the latitude and longitude values from the GPS

- Calculates distance/estimated time to next county-- if the user tells it where these crossings will occur

- Enables posting your route using Google Maps

- Many other features important to a mobile operator

NO5W

Coverage for the QSO Party Traveler

AZ, NV, UT, OR, WA, ID, MT, WY modeled for 7QP
CT, RI, NH, ME, MA, VT modeled for NE QP
All others including WA are modeled for their own QP
Total counties modeled 2181

Alaska

Washington
Oregon
Idaho
Montana
North Dakota
Minnesota
Wisconsin
Michigan
Maine
Vermont
New Hampshire
Massachusetts
Rhode Island
Connecticut
New York
Pennsylvania
New Jersey
Delaware
Maryland
Washington, DC
Virginia
West Virginia
Ohio
Indiana
Illinois
Iowa
Nebraska
South Dakota
Wyoming
Nevada
Utah
Colorado
Kansas
Missouri
Kentucky
Tennessee
North Carolina
South Carolina
Georgia
Alabama
Mississippi
Arkansas
Oklahoma
Texas
Louisiana
New Mexico
Arizona
California
Hawaii
Florida

■ Tested by NO5W
● Developed

What's Important to a Mobile QP Op?

- Before contest –
  - Develop route plan
  - Let County Hunters and others know where you're going
- During contest –
  - Know where you are
    - what county you're in
    - how long you've been there
    - how far to the next one
    - how far to waypoints – e.g. Saturday night lodging
  - Change counties efficiently
  - Efficiently log QSOs
  - Efficiently operate on county line(s) - if that's part of your plan

  Demo Focus

- After contest –
  - Submit logs
  - Summarize operation and submit 3830 report
  - Respond to county hunter requests for QSL/MRC

NO5W

Some Decision Questions of a Mobile QP Op

- What county am I in?

- Do I have time to change bands/modes before the next county?

- Should I ask driver to pull over/slow down to finish working the pileup or will the time required to get to the next county suffice?

- If we stop for gas can we make it to the next county before the closing bell?

- Am I about to cross into a new county and if so can I convince the operator I'm currently working to stick around for another QSO

NO5W

- There's no county marker – for some reason

- You were passing an 18-wheeler when the marker went by

- You were busy on the radio and your driver was day dreaming about the new kitchen you promised her for driving you on this TQP trip.

CQ/X: GPS Panel

GPS: ON(Local)

Sats In View: 07
GPS Time: 20:06:04Z

Latitude: 30.5317N
Longitude: 96.6877W
Speed: 56.9 MPH
Heading: 147 (SE)

Update Rate: 10 secs
Alert Range: 5 miles

Miles to Waypoint:
K-Bob's Brenham

29.9

Miles to Next County
18.11

Time (In Cty/To Next)
37:22/19:07
Closing MPH = 56.8
BURL-WASH-SR36
GPS Advisory: AUTO
You are in/near

Cty	In/O	Ratio
BURL	IN	▼ 0.19
BZOS	OUT	▼ 0.89
MILA	OUT	▲ 0.93

Directly from the GPS receiver

Specified by the operator

Next county line crossing
- Based on defined route
- Determined by program
- Program will request assistance from operator if current county is the From county for more than one crossing

Clear

QSO Entry

RK2FWA RK2

Spot

17.96

[BURL 37:32][17.96 19:44 WASH]

M-Needs CW ▼ 10 **15** 20 40 80 160

Q-Needs CW ▼ 10 **15** 20 40 80 160

Analyses Performed by CQ/X

- Calculates distance from current location to user-specified points
  - To waypoints defined by user
  - To county line crossings defined by user
  - Time estimates to county line crossings
- Where Am I Analysis
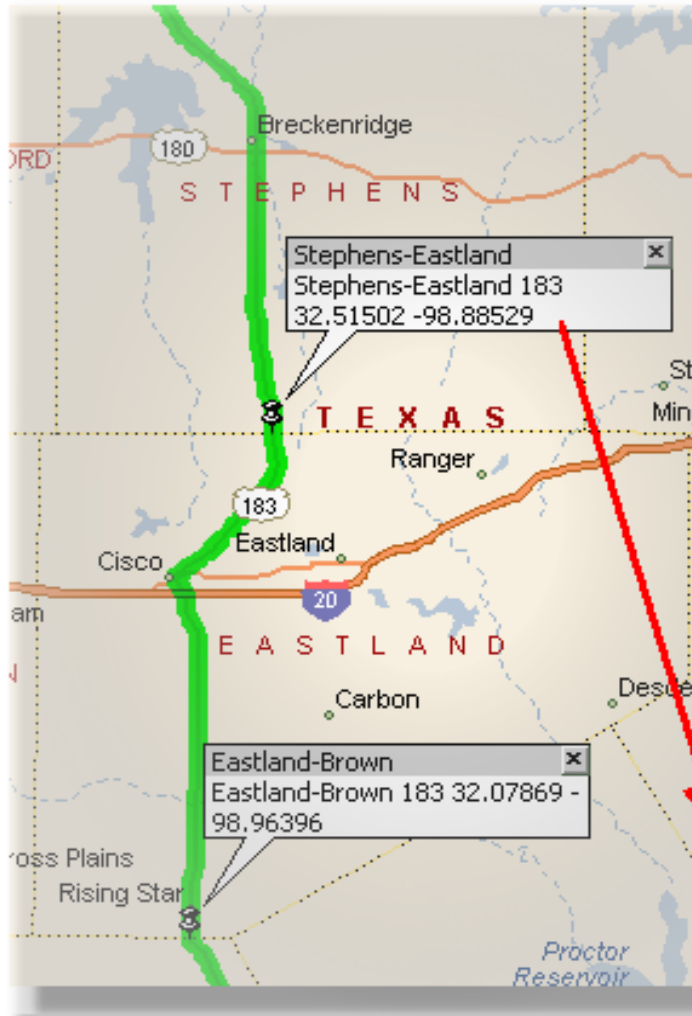 - Which county am I in? ⟵ Tonight's Focus
  - How long have I been in this county?
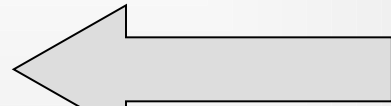
User Data Requirements

- ## Auto county detection –
  - – No user data required

- ## Time/distance to next county
  - – User provides a county line crossing file

NO5W

Streets & Trips

Stephens-Eastland
Stephens-Eastland 183
32.51502 -98.88529

Eastland-Brown
Eastland-Brown 183 32.07869 -98.96396

TQP04_Route3_Crossings.txt - Notepad

File   Edit   Format   View   Help

```
Camp-Titus 21 33.03894 -95.09330
Titus-Franklin 21 33.08801 -95.12576
Franklin-Wood 115 32.96190 -95.18410
Wood-Upshur 2088 32.86516 -95.15229
Upshur-Marion 155 32.85030 -94.70013
Marion-Cass 155 32.87954 -94.61255
Cass-Bowie 8 33.25943 -94.35293
Bowie-RedRiver 82 33.55474 -94.74635
RedRiver-Lamar 82 33.66308 -95.31055
Lamar-Fannin 82 33.59768 -95.85665
Fannin-Grayson 82 33.60156 -96.38225
Grayson-Cooke 82 33.65414 -96.94387
Cooke-Montague 82 33.67966 -97.48501
Montague-Clay 82 33.81609 -97.97795
Clay-Wichita 82 33.88210 -98.42275
Wichita-Archer 82 33.83522 -98.66861
Archer-Baylor 82 33.71030 -98.95325
Baylor-Throckmorton 183 33.39839 -99.21233
Throckmorton-Stephens 183 32.95682 -99.0216
Stephens-Eastland 183 32.51502 -98.88529
Eastland-Brown 183 32.07869 -98.96396
```

Crossings for Import into CQx

Optional – benefit is ability to calculate distance and time to next county

So How's County Detection Work?

- CQ/X contains boundary data from USGS
- Two-step detection process
  - Find counties whose outer circles contain the current location
  - For those counties perform a wrapping number analysis to find the county you're in
- Form a pool of possible next counties
- Perform two-step process on the pool every 4-10 secs
- Modify the pool when moving to next county

Two Steps to Which County Am I In?

- **Step 1: Perform screening analysis**
  - Determine where I definitely am **<u>NOT</u>**
  - Usually reduces possible counties to < 5 - 6
- **Step 2: Perform detailed analysis**
  - For each county that passes the screen
  - Represent county by a polygon –
    - an ordered set of latitude/longitude values
    - Some counties have small sets some require large sets
  - For each county polygon answer –
    - am I Inside or Outside?

Screening: A Simple Example

Outer circle of B

A

B

C

E

Outer circle of C

D
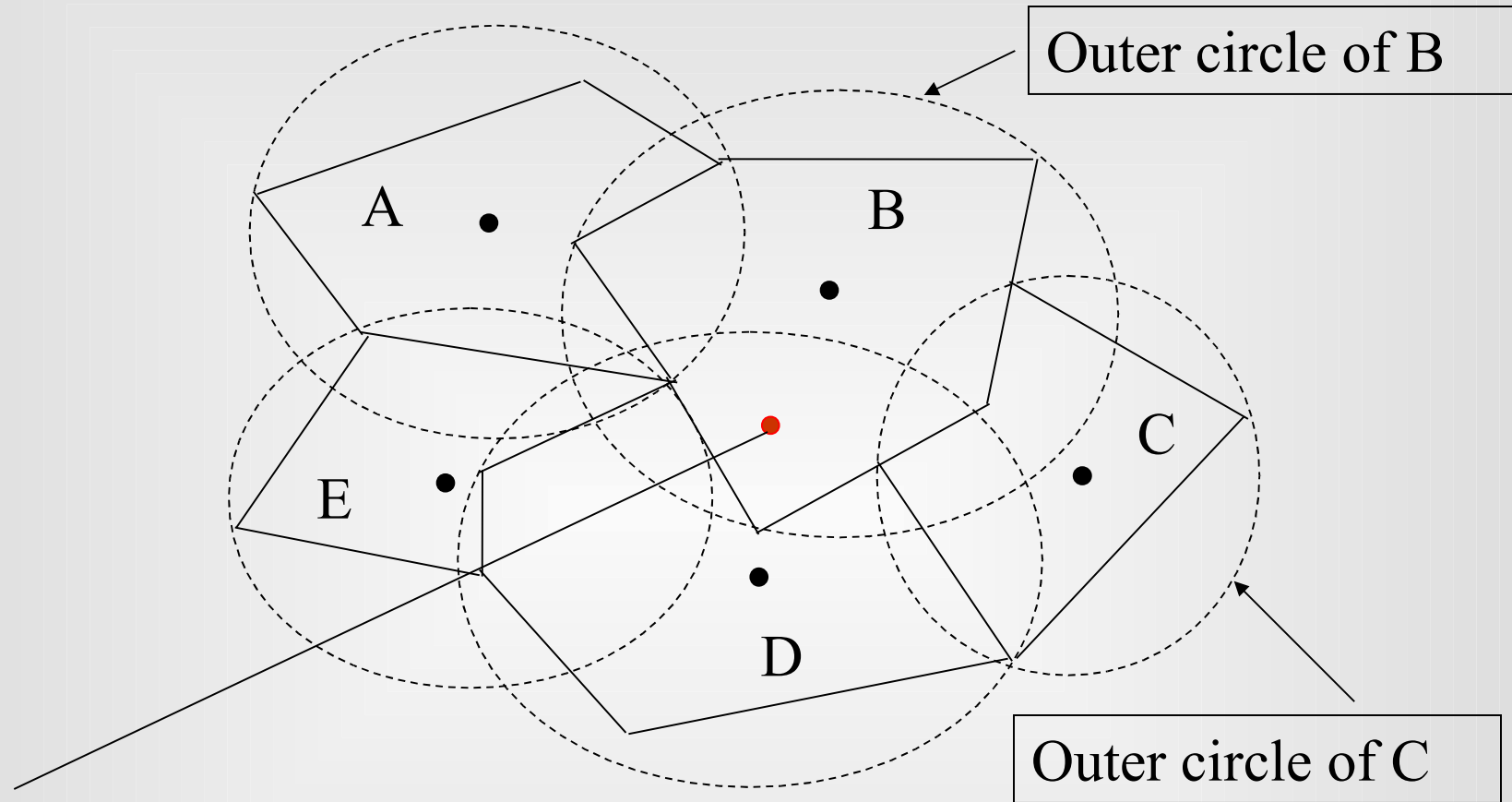
Current point: definitely not in A, C, or E.
Must be in either B or D.

1. To be in a given county you **must** be in its outer circle.
2. If you are in the outer circle of a county you still **may** not be in the county
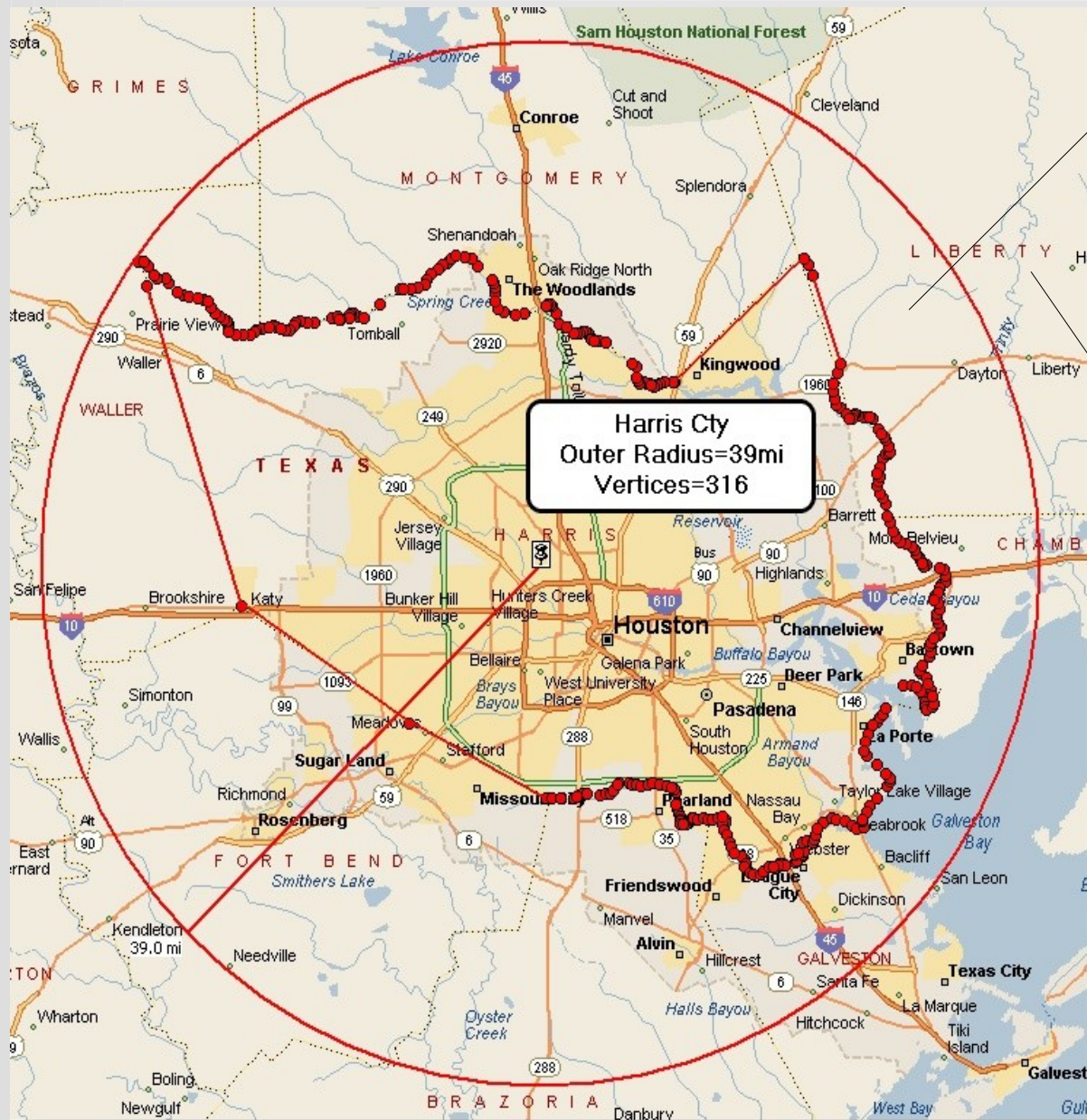
Detailed Analysis: A Simple Example

Winding number analysis (WNA) –
1. tie a piece of old phillystran to your current point ●
2. traverse the boundary of each polygon and when done count the number of wraps of the phillystran. If the count is non-zero that's the county you're in.

B

D
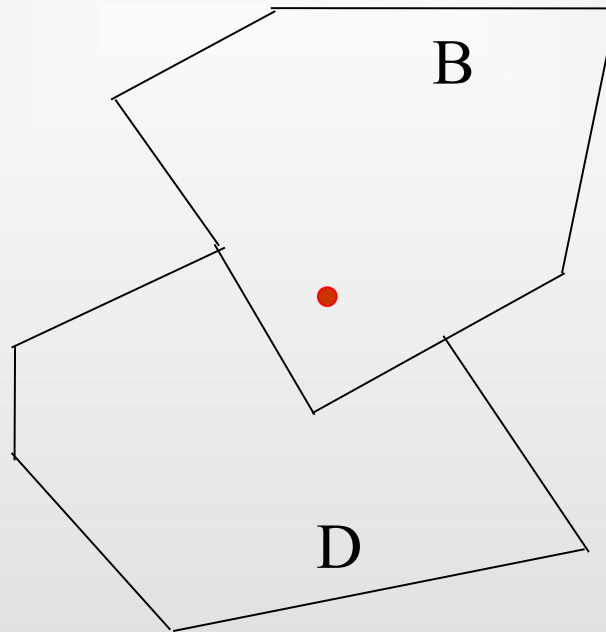
Harris County Boundary Model

Harris Cty
Outer Radius=39mi
Vertices=316

If you're not in Harris county's outer circle you aren't in Harris

On the other hand even if you **are** in the outer circle you could be in

Liberty,
Montgomery
Grimes,
Waller,
Fort Bend
Brazoria,
Galveston
Chambers

NO5W

Harris County Boundary Model – In Numbers

```
COUNTY=HARR
Longitude,Latitude
0.0,0.0
-95.09179000,30.16627900
-95.26129000,30.03306000
-95.26450000,30.03228400
-95.27453000,30.03225900
-95.28040000,30.03113700
-95.28419000,30.02946700
-95.28851000,30.02782100
-95.29214000,30.02889300
-95.29417000,30.03035500
-95.29886000,30.03147300
-95.30250000,30.03254700
-95.30784000,30.03140100
-95.30984000,30.03331900
-95.31124000,30.03658900
-95.31159000,30.04897700
-95.31665000,30.05286000
-95.35231000,30.07591800
-95.36074000,30.07627900
-95.36757000,30.07702400
-95.37063000,30.07898500
-95.37153000,30.08177400
-95.37504000,30.08512900
-95.37864000,30.08665700
-95.38236000,30.08635500
-95.38505000,30.08555200
-95.38881000,30.08433500
-95.39303000,30.08451500
-95.40323000,30.09090000
-95.41302000,30.09543400
-95.41718000,30.10614800
-95.42254000,30.11416200
-95.42402000,30.11605600
-95.42721000,30.11573200
-95.42937000,30.11490400
-95.45787000,30.10601000
-95.46898000,30.10555500
-95.48418000,30.10801500
```

37 of the 316 points
Defining the
Harris County Boundary

Meaning of the You Are In/Near Table

NO5W

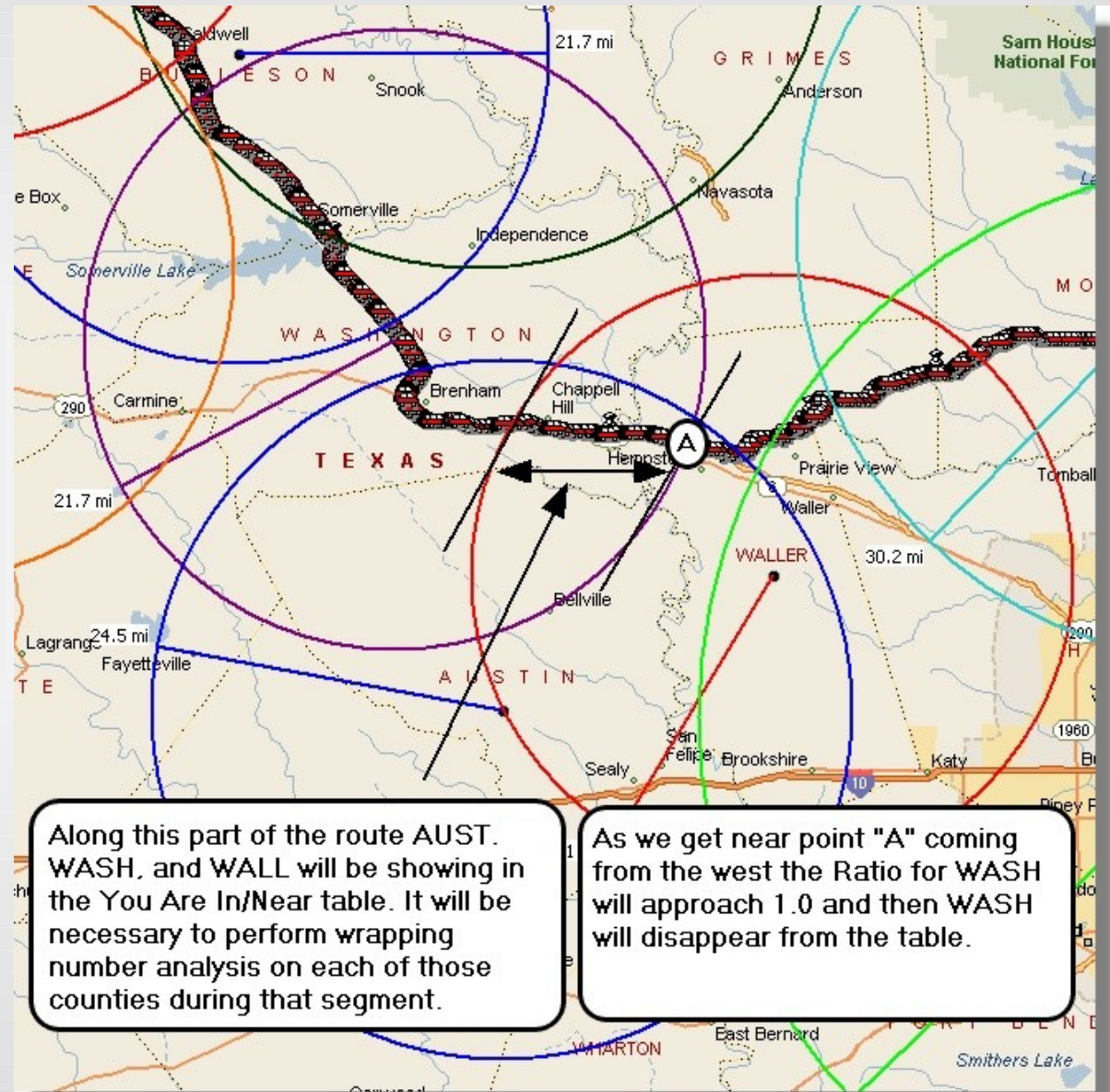**Miles to Next County**

🔴 9.28

Time (In Cty/To Next)

30:28/11:24

Closing MPH = 48.8

WALL-HARR-FM1488

GPS Advisory: AUTO

You are in/near

Cty	In/O	Ratio
WALL	IN	🔻 0.55
AUST	OUT	🔺 0.90
WASH	OUT	🔺 0.95

Along this part of the route AUST. WASH, and WALL will be showing in the You Are In/Near table. It will be necessary to perform wrapping number analysis on each of those counties during that segment.

As we get near point "A" coming from the west the Ratio for WASH will approach 1.0 and then WASH will disappear from the table.
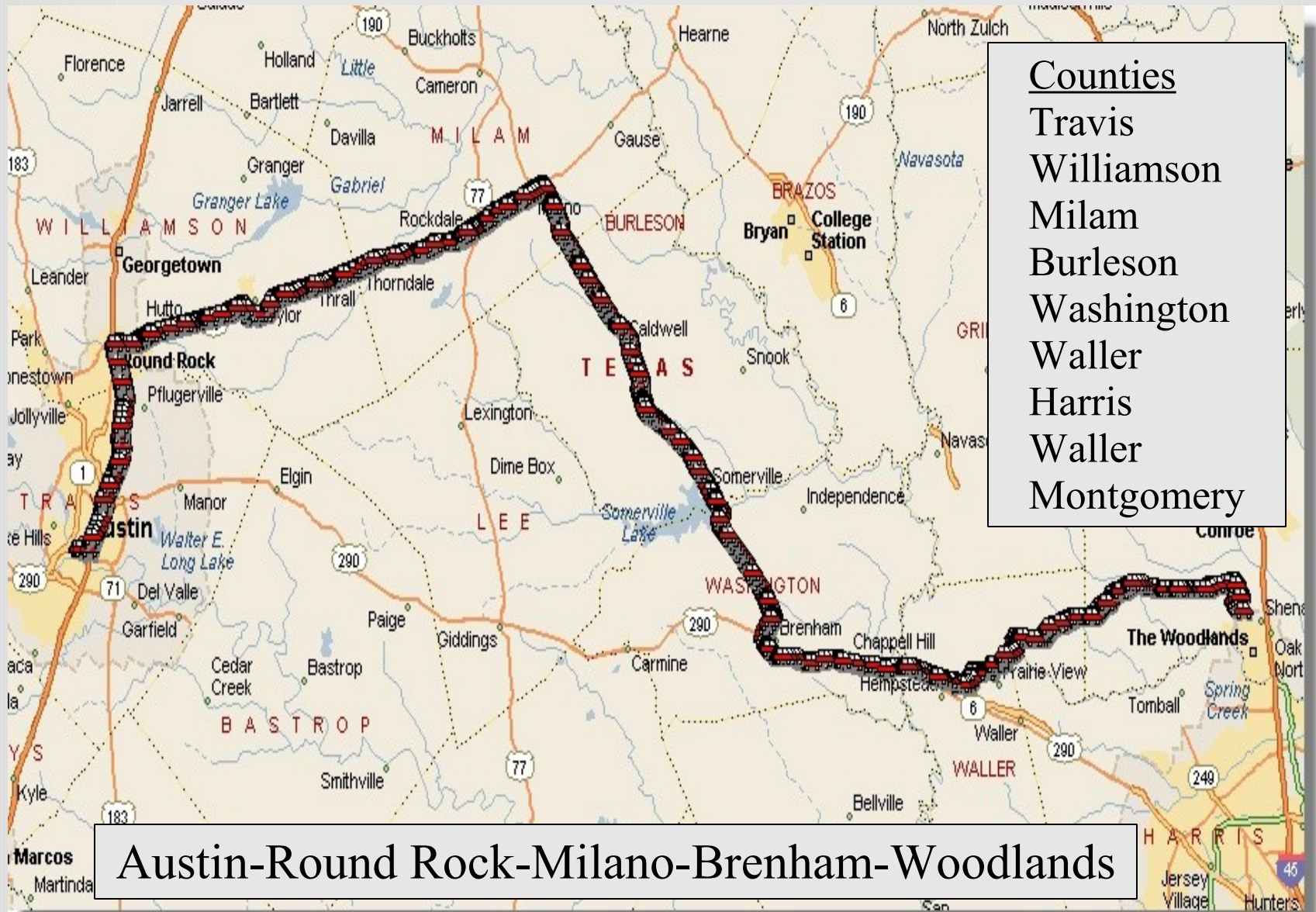
To the CQ/X Demo
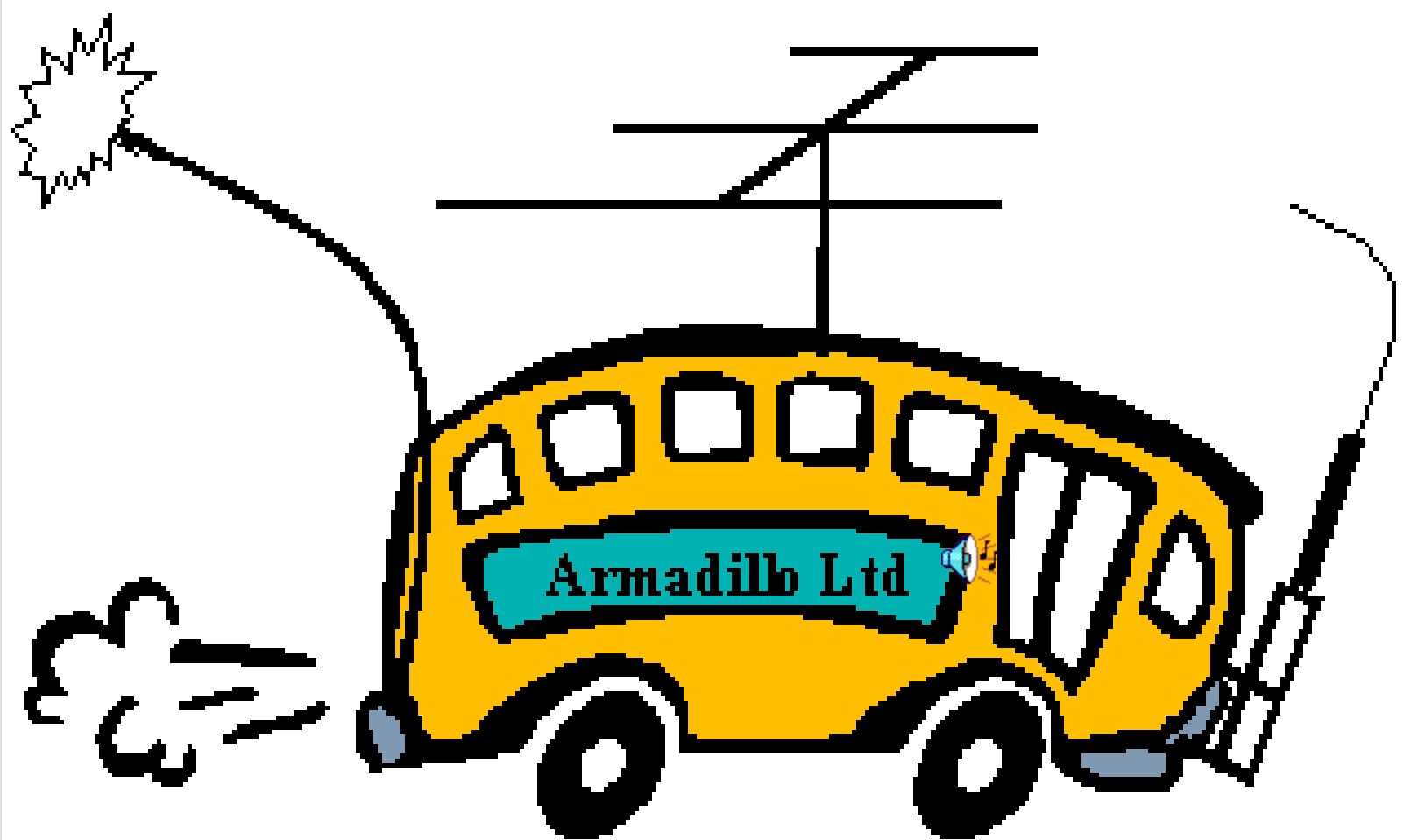
Thanks to Ray Benson and Asleep at the Wheel for Miles and Miles of Texas – unofficial theme song of TQP mobiles

The Demo Configuration

Keying Line

CAT - RS232

USB Port

Serial Port

Laptop

CQ/X

GPS Simulator

Demo Route – Austin to Woodlands

Counties
Travis
Williamson
Milam
Burleson
Washington
Waller
Harris
Waller
Montgomery

Austin-Round Rock-Milano-Brenham-Woodlands

CQ/X de NO5W

■ ■ ■ ■ ■ ■ ■ ■ ■

GPS-Enabled Software for Mobile Contesting

C.W. Sanders – NO5W
The Woodlands, TX
no5w@consolidated.net
Download site: www.no5w.com

GPS Advisory: AUTO

You are in/near

Cty	In/O	Ratio
BURL	IN	▼ 0.18
BZOS	OUT	▼ 0.89
MILA	OUT	▲ 0.95

www.no5w.com

Station Setup at NO5W/M

Texas DX Society – August 13, 2009

HF Radio

Serial Keyer

GPS Rcvr

Operating Position

Laptop

Paddle

GPS Pass-through

Virtual Serial Port

US INTERFACE Navigator

U S B
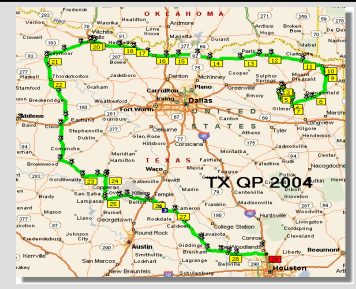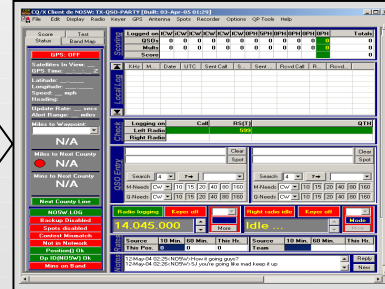
Rear of Vehicle

CQ/X   **S&T**

Navigator USB I/F Box

- Single USB cable to operating laptop
- Contains CAT Interface
- Contains WinKey
- Has auxiliary RS-232 port – I use for GPS
- Contains an internal sound card for digital modes