

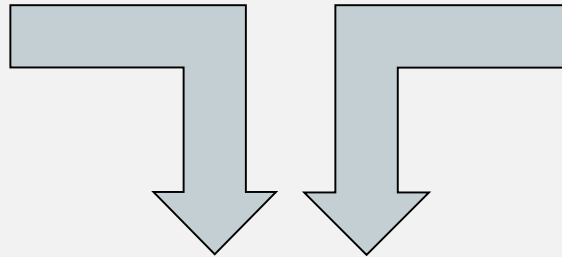
MESA COUNTY'S RTVRN



32 STATIONS/14 NGS CORS

ROVER/USER COMPONENTS OF VRS

GNSS
RECEIVER



DATA CONNECTION
(E.G. SMARTPHONE, WIFI
DEVICE, SIM CARD IN
SURVEY CONTROLLER OR
SATELITE DATA SERVICE)

SURVEY
CONTROLLER



KEY FIELD TIME SAVINGS OF VRS

- NO GNSS BASE SETUP TIME.
- INSTANTANEOUS START-UP AND INITIALIZATIONS
- ROBUST COMMUNICATIONS VIA CELLULAR NETWORK.

WHAT MAKES UP THE RTVRN???

1. REFERENCE STATIONS & NGS CORS
2. RTVRN VIRTUAL SERVER
3. DATA COMMUNICATIONS

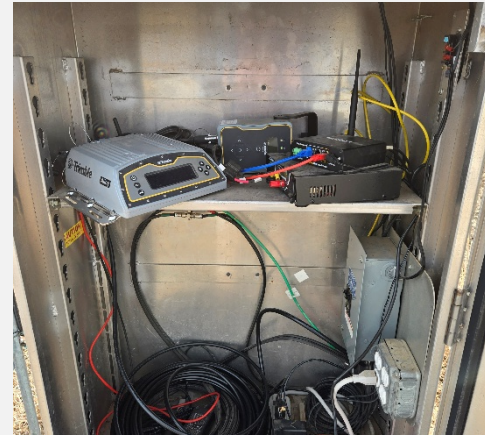
I. REFERENCE STATIONS & NGS CORS



NETWORK COMPONENTS OF A REFERENCE STATION & NGS CORS

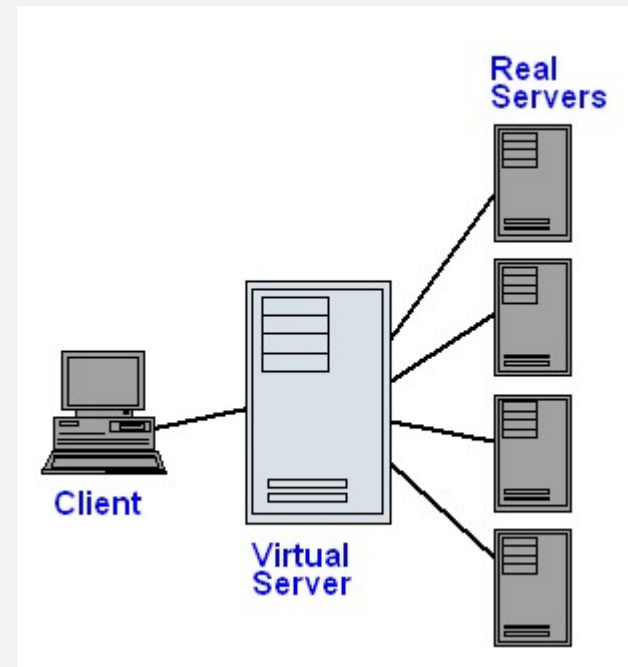
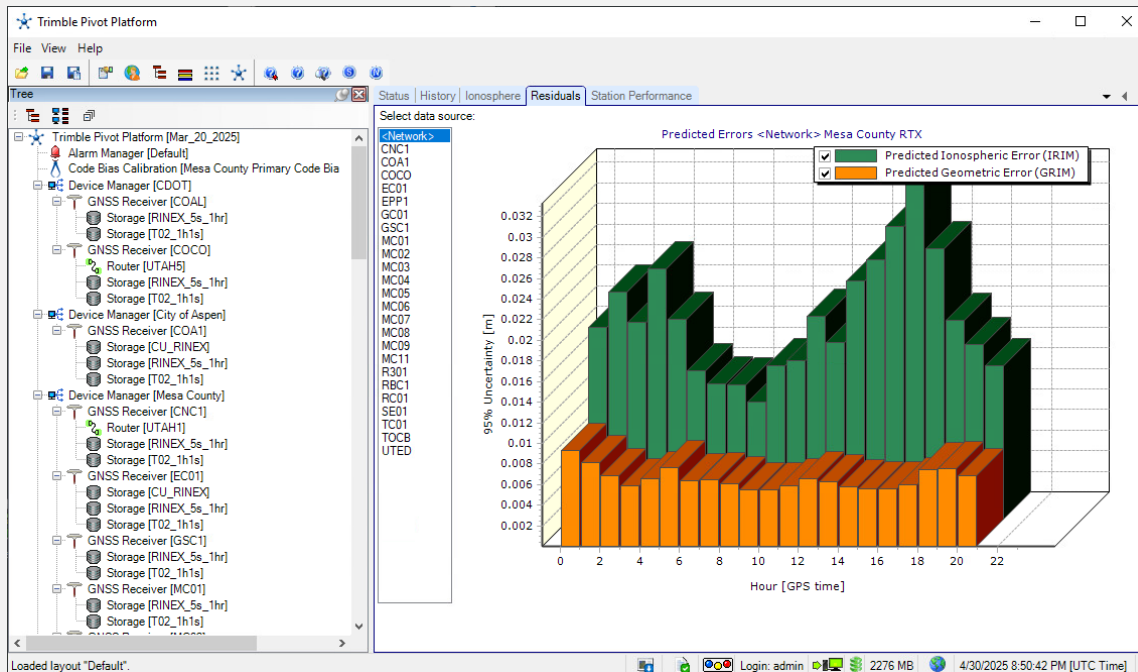


MONUMENTATION



HARDWARE

RTVRN VIRTUAL SERVER



TRIMBLE PIVOT PLATFORM IS RUN ON A VIRTUAL SERVER THAT IS PART OF THE MESA COUNTY SERVERS AT 544 ROOD AVE., GRAND JUNCTION, COLORADO.

THE RTVRN VIRTUAL SERVER

What is a virtual machine?

A virtual machine is a software computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.

Every virtual machine has virtual devices that provide the same functionality as physical hardware. Virtual machines get CPU and memory, video cards, access to storage, and network connectivity from the hosts they run on.

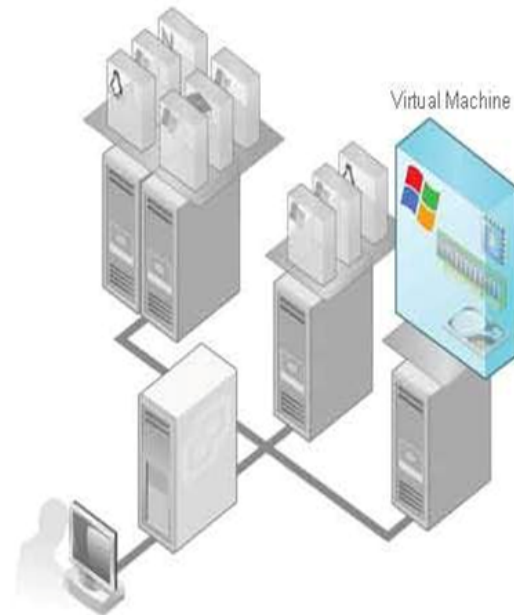
In vSphere, virtual machines run on hosts or clusters. Multiple virtual machines can run on the same host or cluster at the same time.

Related Topics

[What is virtual hardware?](#)

[Using virtual machines](#)

[Benefits of virtual machines](#)



TRIMBLE PIVOT PLATFORM MAKES IT ALL WORK

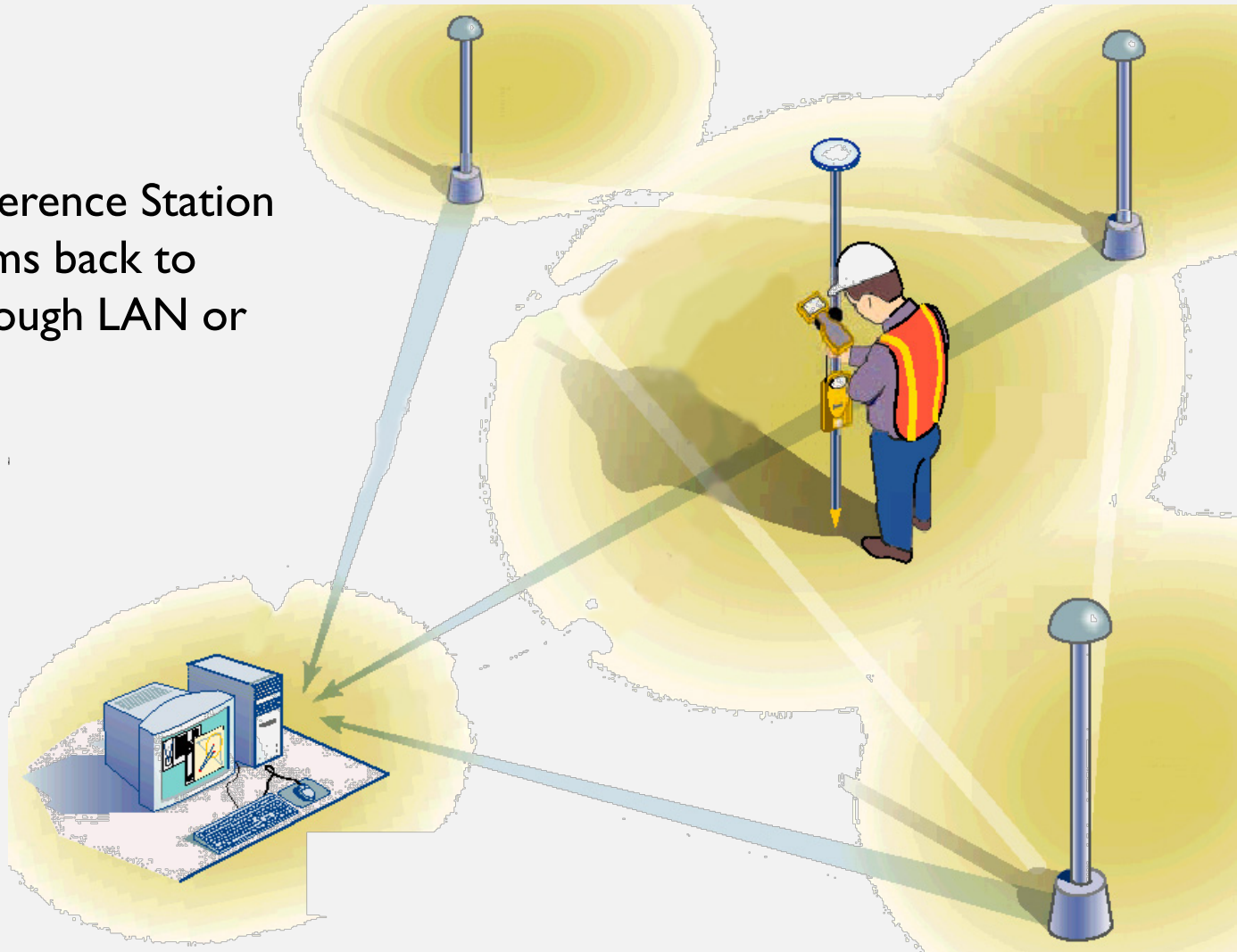
The screenshot displays the Trimble Pivot Platform software interface. On the left is a 'Tree' view showing a hierarchical structure of devices and managers. The main area is a 'Network Map' showing a complex network of GNSS receivers connected by lines. A legend on the right lists map options: 'Show labels', 'Show text', 'Show rovers', 'Show stations', and 'Show baselines'. A scale bar at the bottom left indicates 50000 m.

Tree View:

- Trimble Pivot Platform [Mar_20_2025]
 - Alarm Manager [Default]
 - Code Bias Calibration [Mesa County Primary Code Bia]
 - Device Manager [CDOT]
 - GNSS Receiver [COAL]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [COCO]
 - Router [UTAH5]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - Device Manager [City of Aspen]
 - GNSS Receiver [COA1]
 - Storage [CU_RINEX]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - Device Manager [Mesa County]
 - GNSS Receiver [CNC1]
 - Router [UTAH1]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [EC01]
 - Storage [CU_RINEX]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [GSC1]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [MC01]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [MC02]
 - Storage [CU_RINEX]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]
 - GNSS Receiver [MC03]
 - Router [UTAH2]
 - Storage [CU_RINEX]
 - Storage [RINEX_5s_1hr]
 - Storage [T02_1h1s]

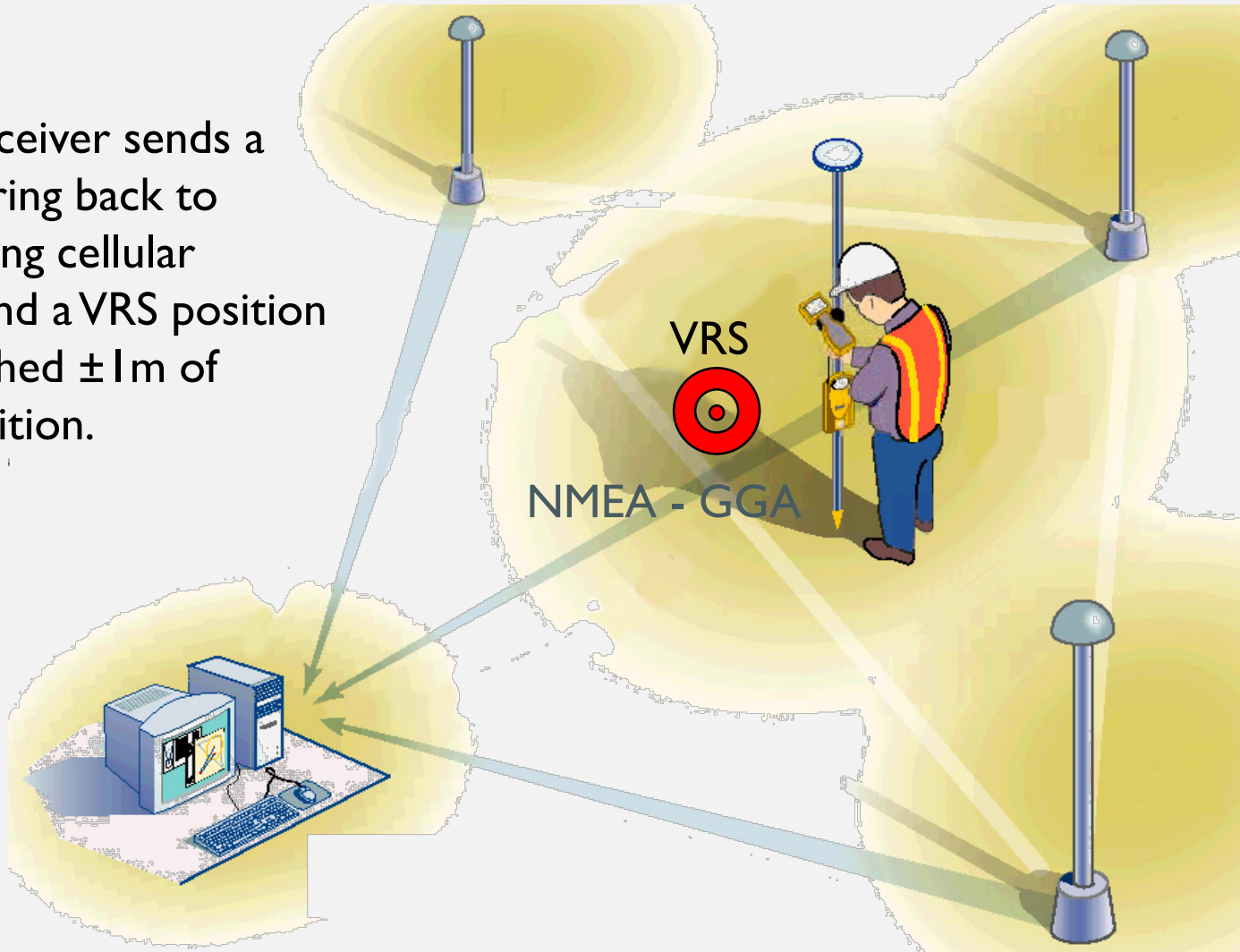
DATA FLOW

CORS/Reference Station
data streams back to
server through LAN or
Internet



DATA FLOW

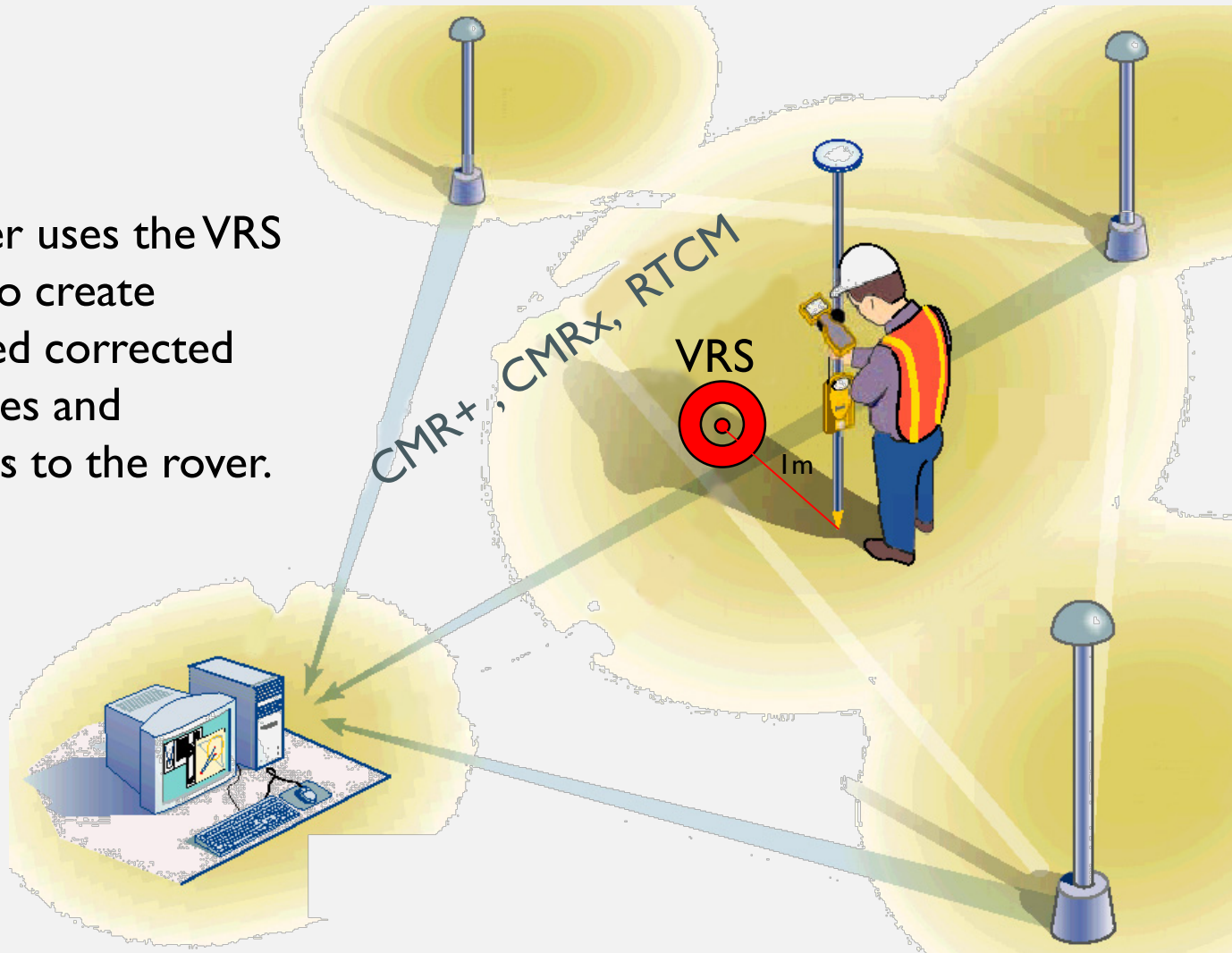
Roving receiver sends a NMEA string back to server using cellular modem and a VRS position is established $\pm 1\text{m}$ of rover position.



\$PTNL,GGA_SYNC,2|1230.00,120710,3900.6|85558|,N,10829.35703049,W,3,08,2.7,EHT|449.3|4,M*04

DATA FLOW

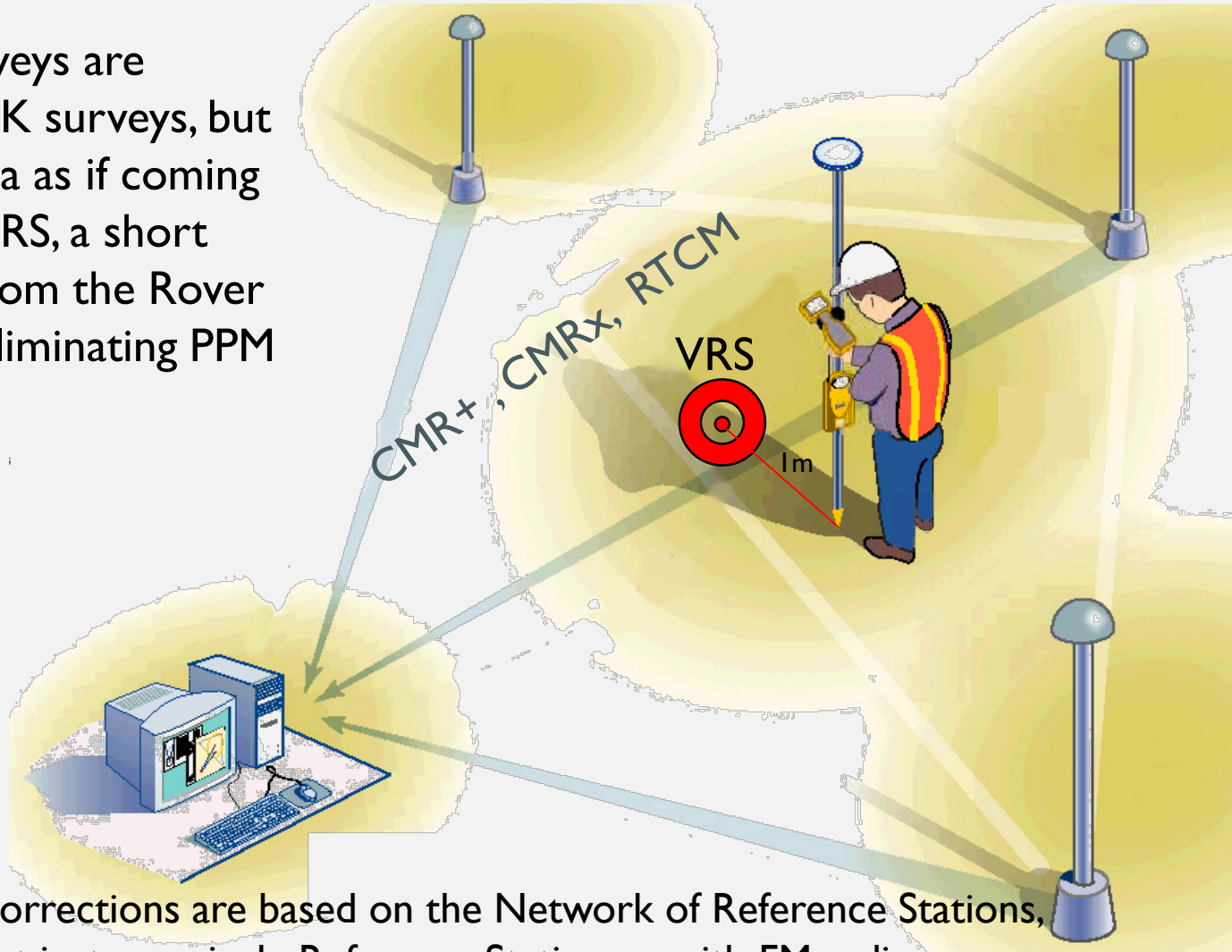
The server uses the VRS position to create customized corrected observables and broadcasts to the rover.



= Very short Baselines = NO PPM Error!

DATA FLOW

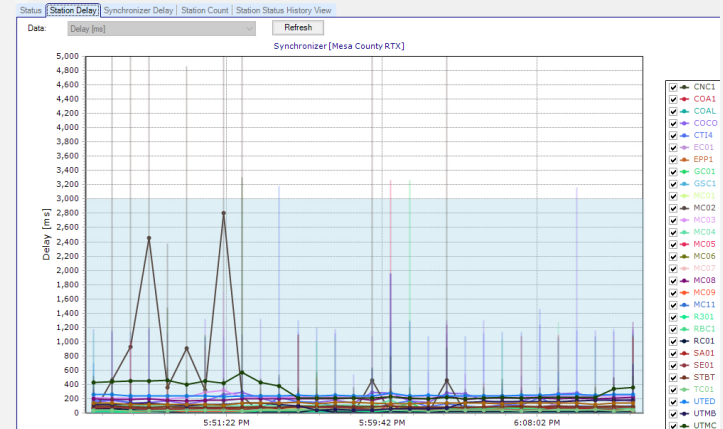
Rover surveys are normal RTK surveys, but getting data as if coming from the VRS, a short distance from the Rover position, eliminating PPM error.



Corrections are based on the Network of Reference Stations, not just one single Reference Station, as with FM radio broadcast: a single baseline RTK!

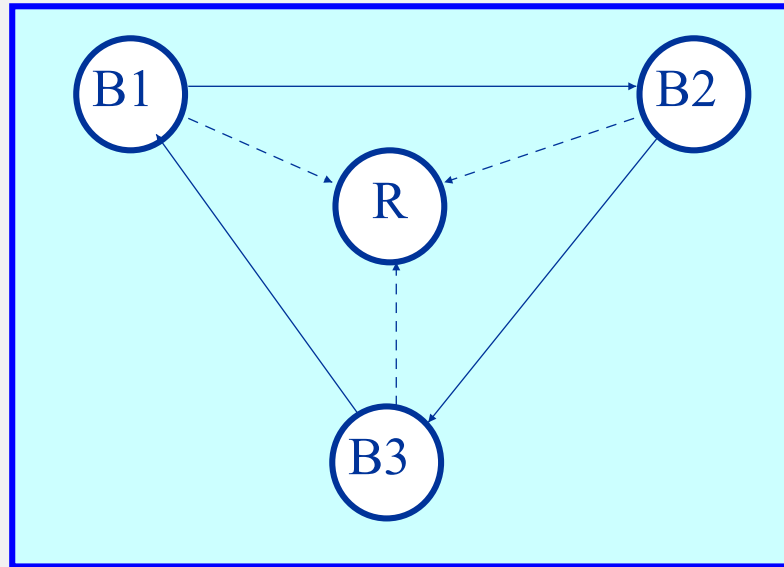
VRS - HOW DOES IT WORK?

- Network Processes
 - Integrity monitoring
 - Geometric correction
 - Correction for tropospheric/ionospheric errors
 - Ambiguity resolution
 - Consistency check
 - Delivery of customized VRS corrections to your Rover location.



NETWORK MULTIPLE BASE STATION SOLUTION

Let B1, B2, and B3 be base stations, and R be the rover.

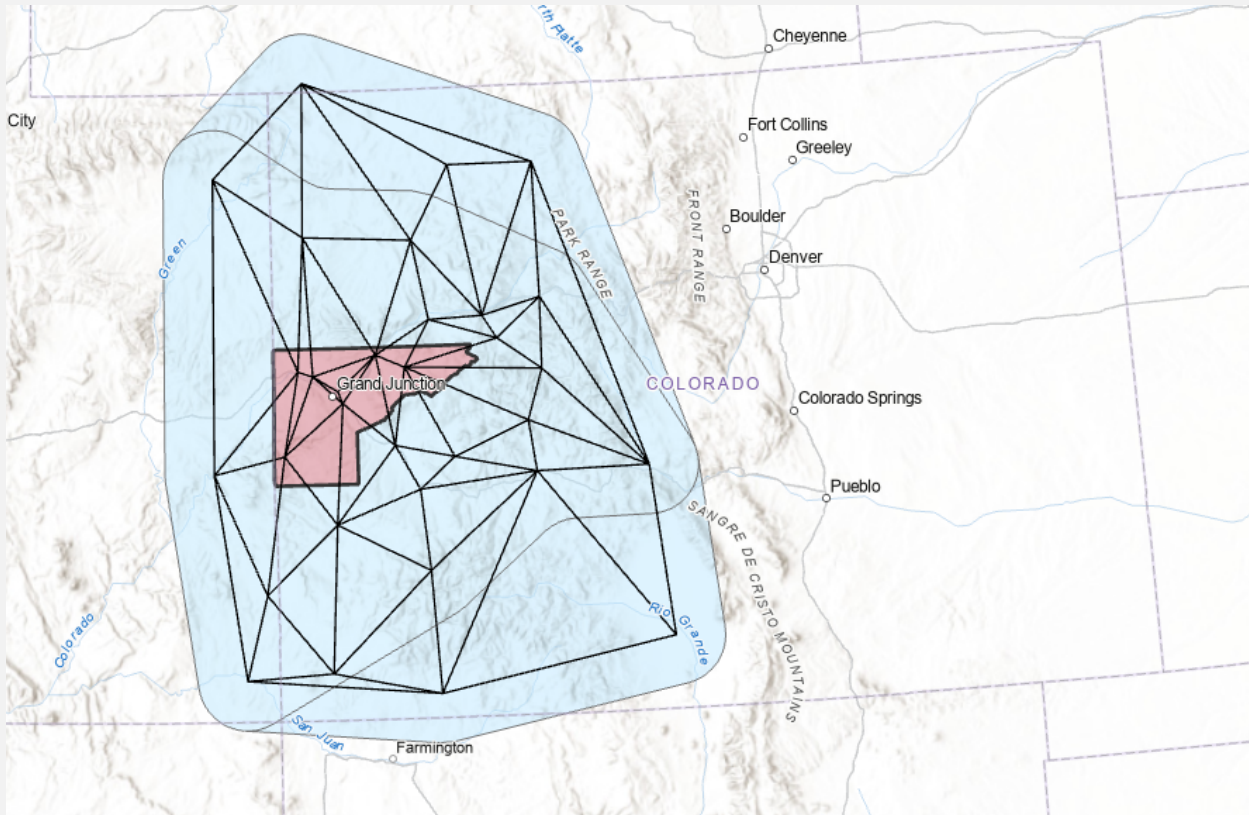


Four RTK engines run simultaneously:

1. (1,2)
2. (2,3)
3. (3,1)
4. (1,R)+(2,R)+(3,R)

SET LIMITATIONS

100 KM / 62 MI OUTSIDE THE LIMITS
OF THE NETWORK



THE VRS SOFTWARE WILL NOT ALLOW A ROVER
TO INITIALIZE IF IT IS OUTSIDE THIS LIMIT

SET LIMITATIONS

5 MILES IS THE
MAXIMUM DISTANCE
FROM A VRS OR PRS.

VRS / PRS



5 MI



WHEN THAT DISTANCE IS EXCEEDED, THE NETWORK SOFTWARE
WILL FORCE THE ROVER TO RE-INITIALIZE AND REFERENCE TO A
NEW VRS. THIS MAY OR MAY NOT CHANGE THE PHYSICAL
REFERENCE STATION (PRS) OR CORS.

ADVANTAGES OF VRS

- Eliminates dependency on a single reference station or base station and Baseline PPM error.
- Corrections are based on the entire Network, not just one Reference Station.
- Uses established communications.
- Establishes a single coordinate system.

**AND A RTVRN
SUBSCRIPTION IS
FREE!!!!**