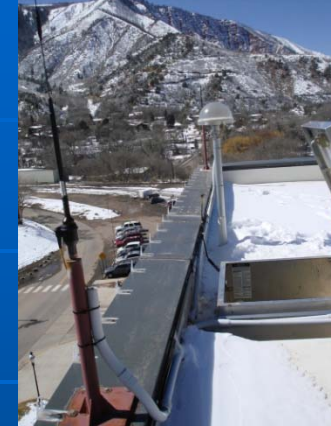


# MESA COUNTY'S RTVRN



32 STATIONS/15 NGS CORS

# Rover/User Components of VRS

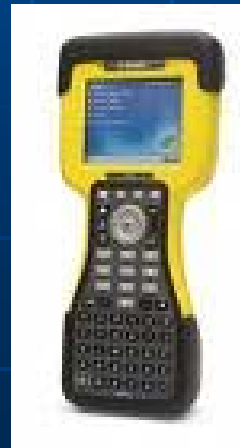
GNSS  
RECEIVER



CELLULAR DATA  
VIA SMART PHONE  
OR WIFI DEVICE



SURVEY  
CONTROLLER



# Key Field Time savings of VRS

 No GNSS Base Setup Time.

 Instantaneous Start-up and Initializations.

 Robust Communications via Cellular Network.

**= Efficiency!!**

# What makes up the RTVRN???

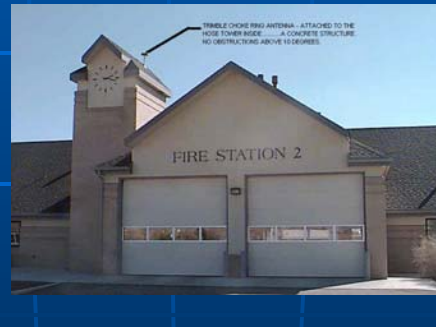
Real Time Virtual Reference Network

# Network Components of VRS

CORS

&

Reference Stations



# Network Components of VRS



Monumentation

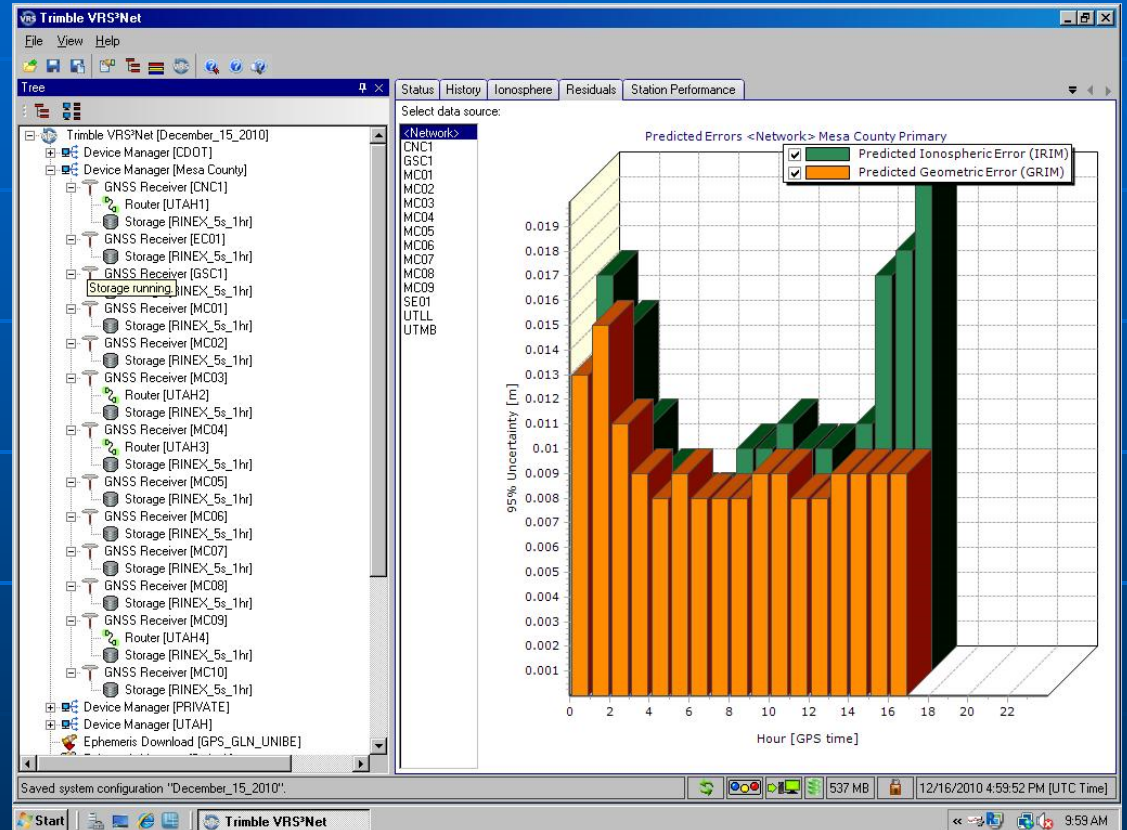


Hardware

# Network Components of VRS



Communications



VRS<sup>3</sup>Net Software

# Infrastructure

## The RTVRN Virtual Servers

### 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.

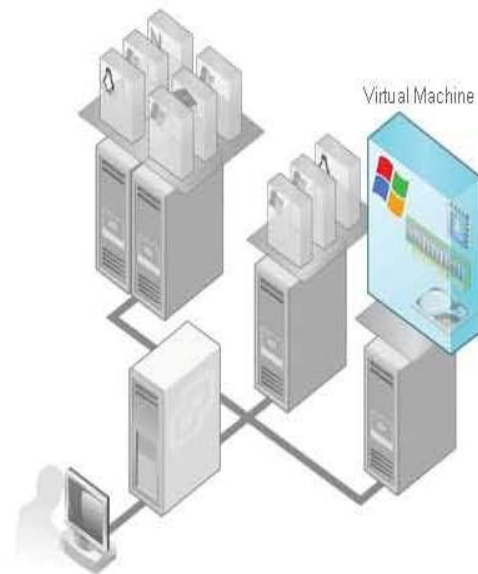
---

### Related Topics

[What is virtual hardware?](#)

[Using virtual machines](#)

[Benefits of virtual machines](#)



544 Rood Ave., Grand Junction, Colorado.



# VRS<sup>3</sup>Net Software makes it all work

GPS1 - Full Control

Trimble Pivot Platform

File View Help

Tree

- Trimble Pivot Platform [September 21\_2020]
  - Alarm Manager [Default]
  - Device Manager [CDOT]
    - GNSS Receiver [COAL]
      - Storage [RINEX\_5s\_1hr]
    - GNSS Receiver [COCO]
      - Router [UTAH5]
        - Storage [RINEX\_5s\_1hr]
      - GNSS Receiver [R301]
        - Storage [RINEX\_5s\_1hr]
    - Device Manager [City of Aspen]
      - GNSS Receiver [COA1]
        - Storage [CU\_RINEX]
        - Storage [RINEX\_5s\_1hr]
    - Device Manager [Mesa County]
      - GNSS Receiver [CNC1]
        - Router [UTAH1]
          - Storage [RINEX\_5s\_1hr]
        - GNSS Receiver [EC01]
          - Storage [CU\_RINEX]
          - Storage [RINEX\_5s\_1hr]
        - GNSS Receiver [GSC1]
          - Storage [RINEX\_5s\_1hr]
        - GNSS Receiver [MC01]
          - Storage [RINEX\_5s\_1hr]
        - GNSS Receiver [MC02]
          - Storage [CU\_RINEX]
          - Storage [RINEX\_5s\_1hr]
        - GNSS Receiver [MC03]
          - Router [UTAH2]
            - Storage [CU\_RINEX]

Network Map Google™ Maps View

  - Show labels
  - Show text
  - Show rovers
  - Show stations
  - Show baselines

Mesa County Primary

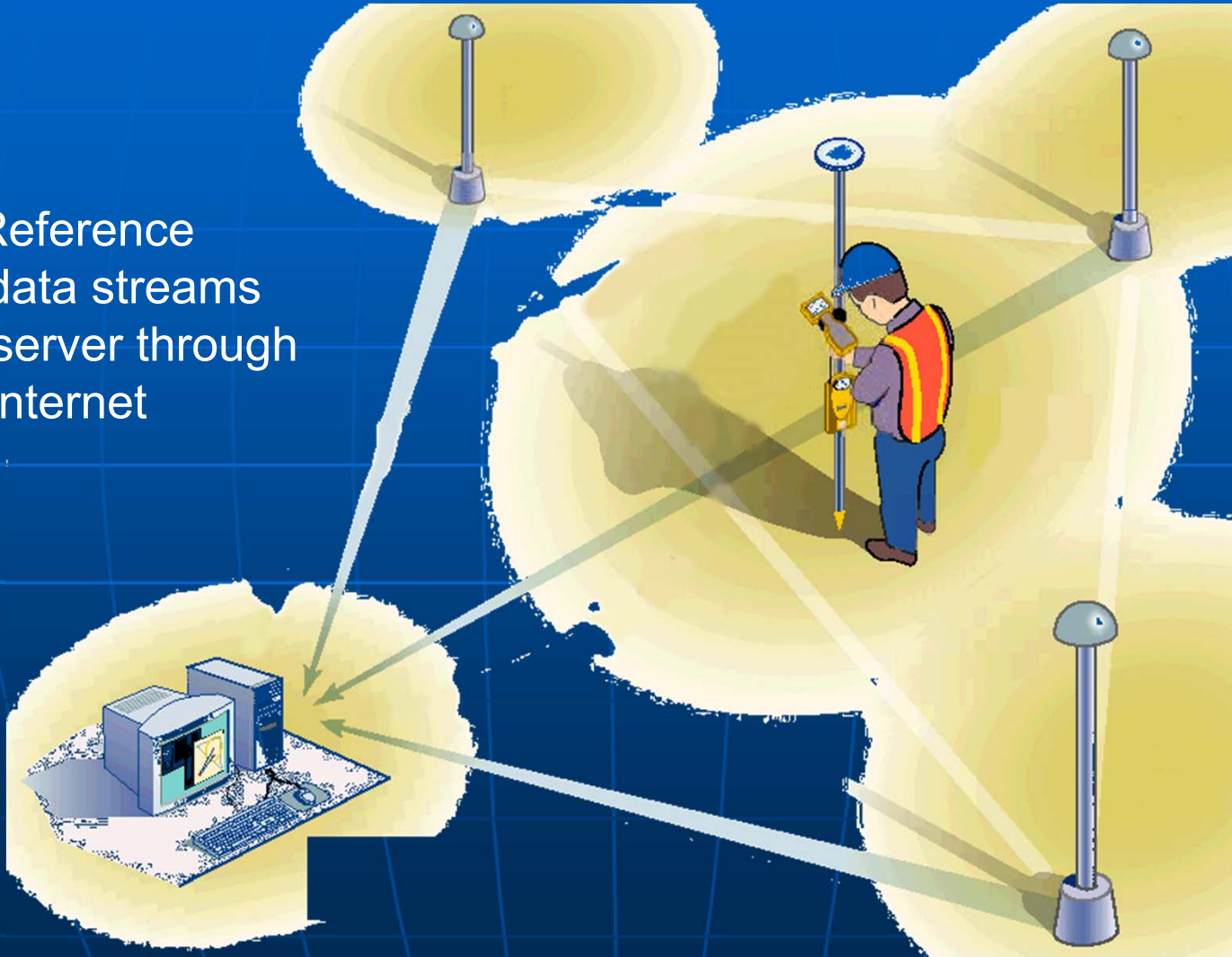
50000 m

Loaded layout "Default".

Login: admin 6715 MB 10/28/202

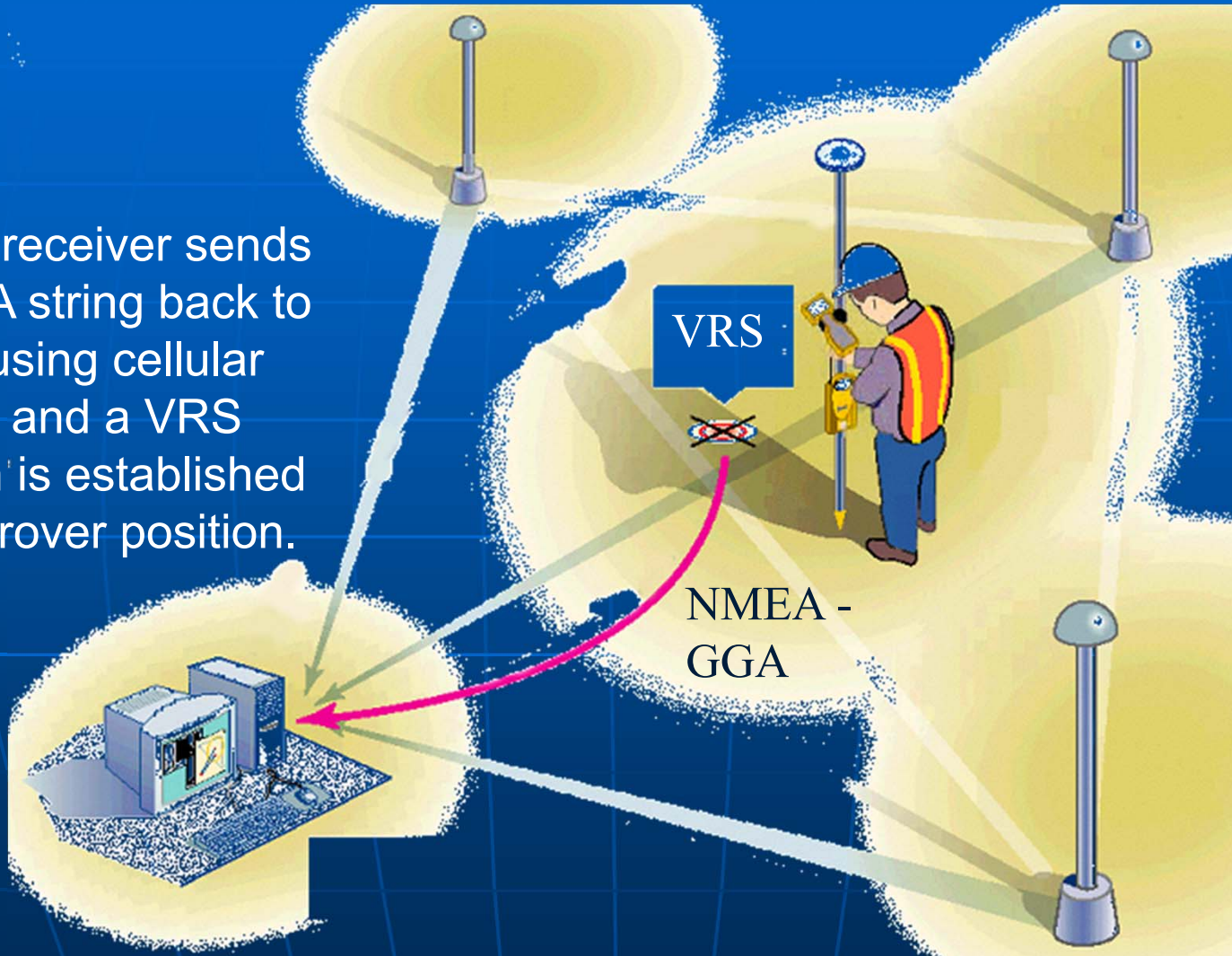
# Data Flow

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



# Data Flow

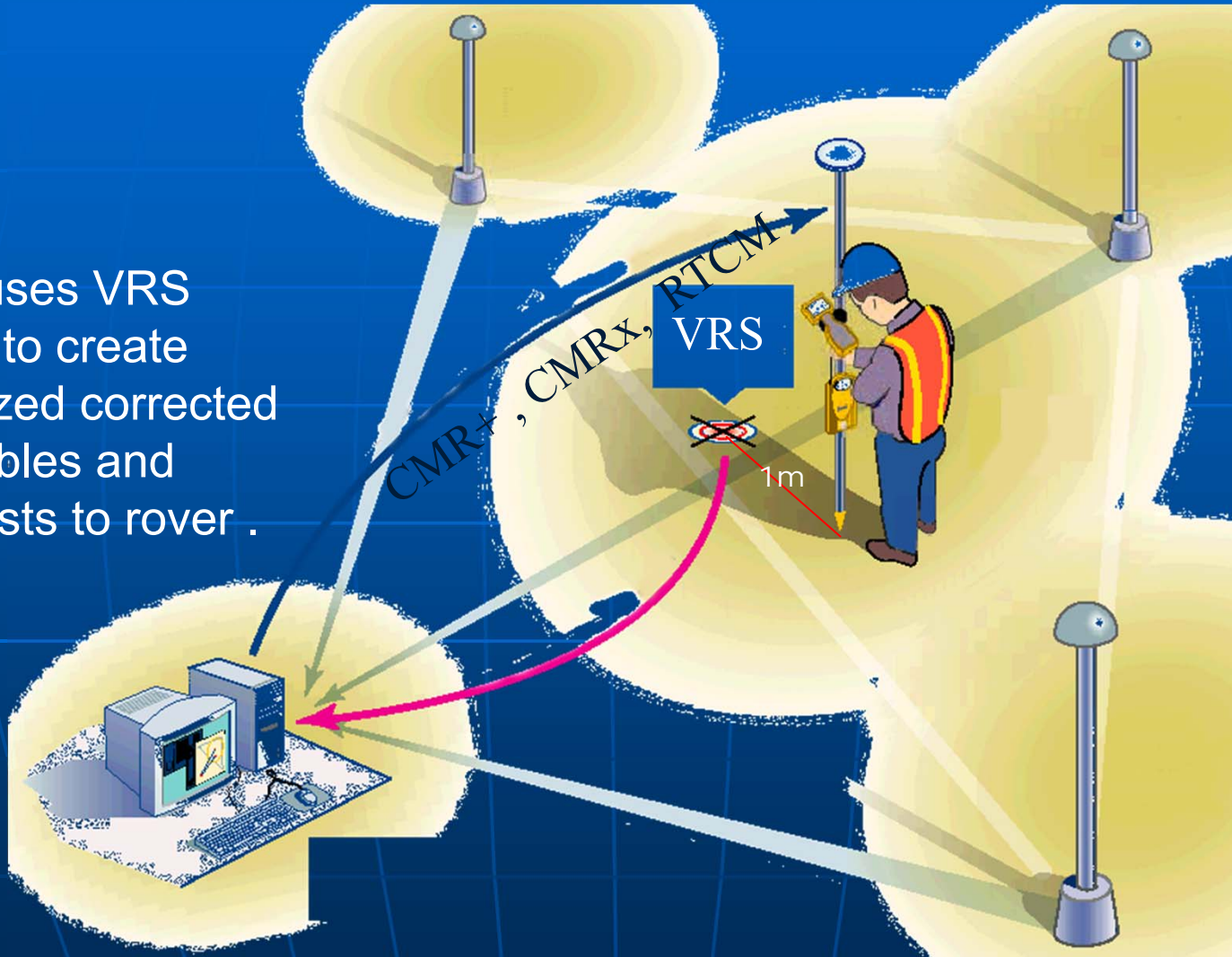
Roving receiver sends a NMEA string back to server using cellular modem and a VRS position is established  $\pm 1\text{m}$  of rover position.



```
$PTNL,GGA_SYNC,211230.00,120710,3900.61855581,N,10829.35703049,W  
,3,08,2.7,EHT1449.314,M*04
```

# Data Flow

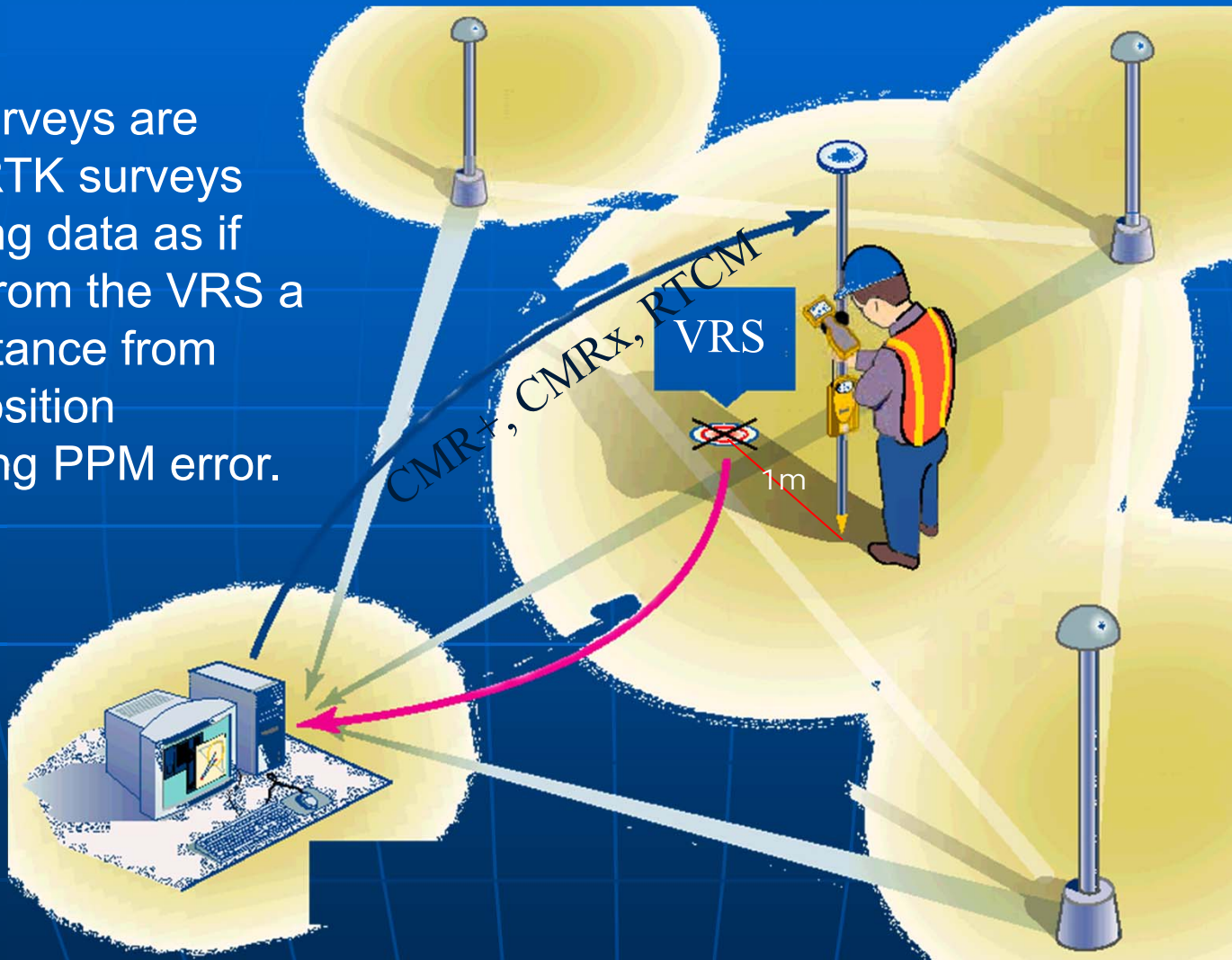
Server uses VRS position to create customized corrected observables and broadcasts to rover .



= 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 Rover position eliminating PPM error.

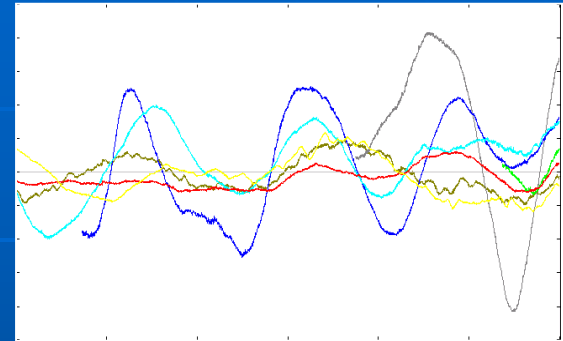


Corrections are based on the Network of Reference Stations and not just one single Reference Station as with FM radio broadcast , single baseline RTK!

# VRS - How does it work?

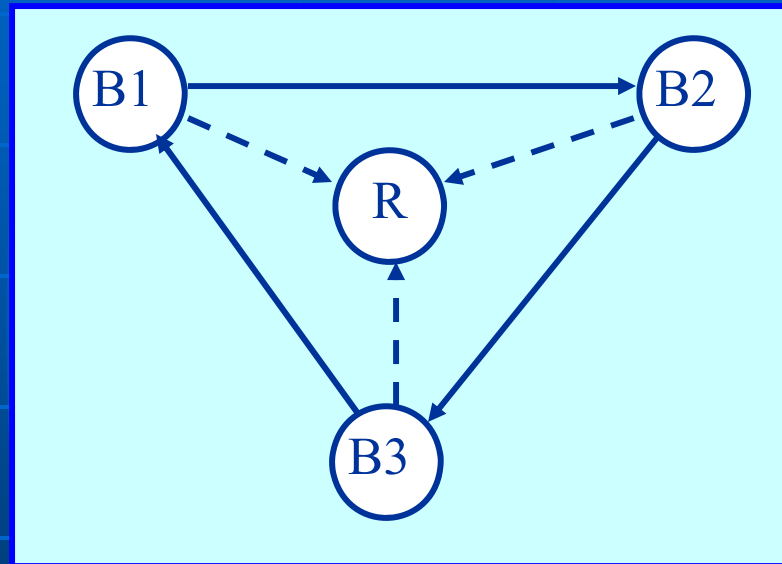
## ➤ Network Processes

- 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 B3 be base stations, R be the rover

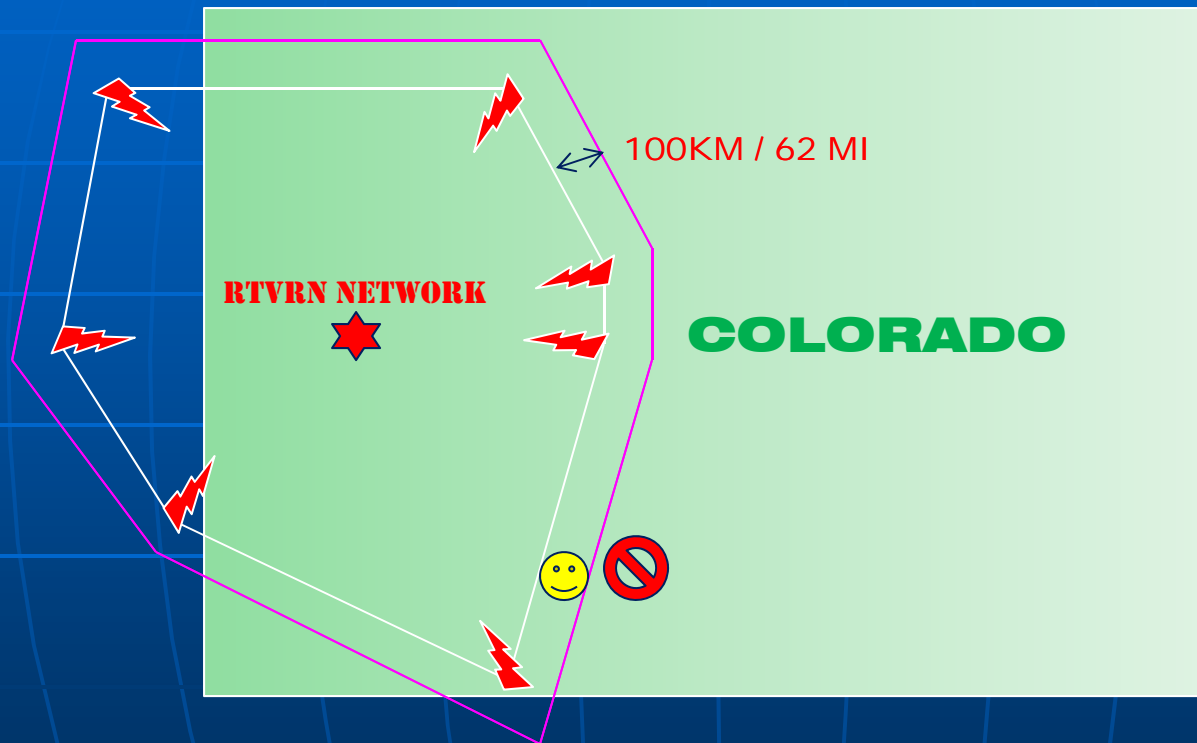


Four RTK engines run simultaneously:

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

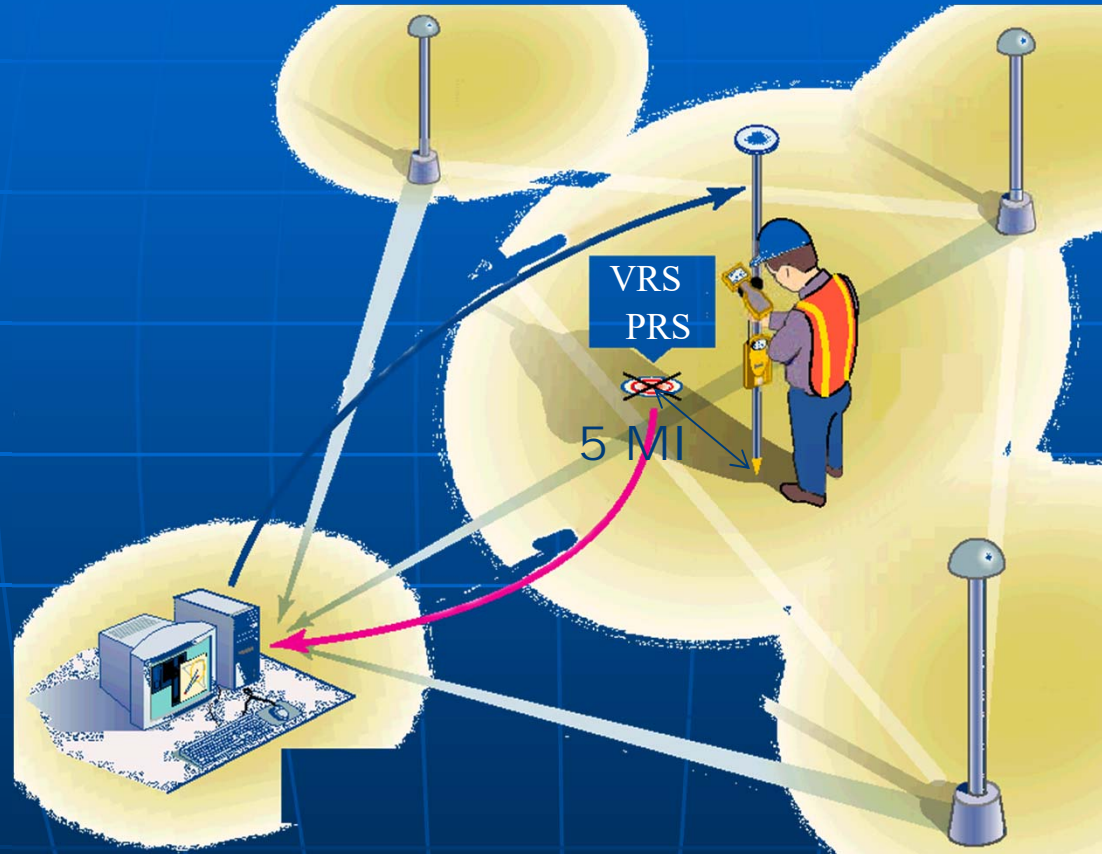


**THE VRS SOFTWARE WILL NOT ALLOW A ROVER  
TO INITIALIZE IF IT IS OUTSIDE THIS LIMIT**



# SET LIMITATIONS

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



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

AND A RTVRN  
SUBSCRIPTION IS  
FREE!!!!

Mesa County RTVRN