



## Multiple Reference Frames



# Getting to a common reference frame\*

What can we do to help customers get to a common reference frame?

Broadcast Coordinates:

- We will provide a transformation\* with disclaimer (for download or parameters for manual entry) to allow customers to “project” back to last adjustment and/or to NAD83(NA2011) Epoch 2010.00
  - For example in October 1, 2012, we will publish new broadcast coordinates, as well as in April 1, 2013 for California.

Transformations will be made available for the following:

- Epoch 2012.750 (October) -> Epoch 2010.00
- Epoch 2013.248 (April) -> Epoch 2012.750 (October)
- Epoch 2013.248 (April) -> Epoch 2010.00



\* Under Development



# Introducing Multiple Reference Frames (MRF)

With Spider 7.1, we are introducing the ability to broadcast Multiple Reference Frames.

- High-Dynamic Areas
  - California
  - Washington / Oregon
- Legal Requirements
  - British Columbia
    - Vancouver Island
    - BC Mainland



# Multiple Reference Frames

## High Dynamic Areas

To allow ease of movement from current epoch to last or common

- High-Dynamic Areas
  - California
    - Common - NAD83(NA2011) Epoch 2010.00
    - Last - NAD83(NA2011) Epoch 2017.250
  - Washington / Oregon
    - Common - NAD83(NA2011) Epoch 2010.00
    - Last - NAD83(NA2011) Epoch 2012.250



# Multiple Reference Frames

## Legal Requirements

To stay in compliance with statutes / laws

- Legal Requirements
  - British Columbia
    - Vancouver Island - NAD83(CSRS) Epoch 1997.00
    - BC Mainland - NAD83(CSRS) Epoch 2002.00



\* Surveyor General's Circular Letter 463



# How do I access Multiple Reference Frames?

First, we break coordinates into classes

- High Dynamic Areas
  - Current
  - Common
  - Last
- Legal Requirement Areas
  - Common
  - Alternate #1
  - Alternate #2
  - ....



# How do I access Multiple Reference Frames?

Second, we have specialized Mountpoints with the required reference frame / epoch pair attached

- High Dynamic Areas
  - Common
  - Last
- Legal Requirement Areas
  - Alternate #1
  - Alternate #2
  - ....



# MRF Mountpoints

Specialize Mountpoints are structured

RTCM3\_IMAX\_1997

Correction  
Format

Correction  
Type

Epoch

MSM\_IMAX\_2017\_250

Correction  
Format

Correction  
Type

Epoch





# Multiple Reference Frames California

| Coordinate Class | Mountpoint Schema  | Port  | Reference Frame | Epoch    |
|------------------|--------------------|-------|-----------------|----------|
| Current          | RTCM3_xxx          | 10000 | NAD83(NA2011)   | 2017.750 |
| Current          | MSM_xxx            | 10000 | NAD83(NA2011)   | 2017.750 |
| Common           | RTCM3_xxx_2010     | 11111 | NAD83(NA2011)   | 2010.000 |
| Common           | MSM_xxx_2010       | 11111 | NAD83(NA2011)   | 2010.000 |
| Last             | RTCM3_xxx_2017_250 | 11111 | NAD83(NA2011)   | 2017.250 |
| Last             | MSM_xxx_2017_250   | 11111 | NAD83(NA2011)   | 2017.250 |

## Correction Types Available

- MAX
- IMAX
- NEAR
- VIRS

# Multiple Reference Frames

## Washington & Oregon

| Coordinate Class | Mountpoint Schema  | Port  | Reference Frame | Epoch    |
|------------------|--------------------|-------|-----------------|----------|
| Current          | RTCM3_xxx          | 10000 | NAD83(NA2011)   | 2018.000 |
| Current          | MSM_xxx            | 10000 | NAD83(NA2011)   | 2018.000 |
| Common           | RTCM3_xxx_2010     | 11111 | NAD83(NA2011)   | 2010.000 |
| Common           | MSM_xxx_2010       | 11111 | NAD83(NA2011)   | 2010.000 |
| Last             | RTCM3_xxx_2012_250 | 11111 | NAD83(NA2011)   | 2012.250 |
| Last             | MSM_xxx_2012_250   | 11111 | NAD83(NA2011)   | 2012.250 |

### Correction Types Available

- MAX
- IMAX
- NEAR
- VIRS

# Multiple Reference Frames

## High Dynamic Areas

### Example Mountpoints in High Dynamic Areas

- Current – Port 10000
  - RTCM3\_IMAX
  - MSM\_IMAX
- Common – Port 11111
  - RTCM3\_IMAX\_2010
  - MSM\_IMAX\_2010
- Last – Port 11111
  - RTCM3\_IMAX\_2017\_250
  - MSM\_IMAX\_2017\_250

# Multiple Reference Frames

## British Columbia

| Coordinate Class | Mountpoint Schema | Port  | Reference Frame | Epoch    |
|------------------|-------------------|-------|-----------------|----------|
| Current          | RTCM3_xxx         | 10000 | NAD83(CSRS)     | 2010.000 |
| Current          | MSM_xxx           | 10000 | NAD83(CSRS)     | 2010.000 |
| Alternate #1     | RTCM3_xxx_1997    | 11111 | NAD83(CSRS)     | 1997.000 |
| Alternate #1     | MSM_xxx_1997      | 11111 | NAD83(CSRS)     | 1997.000 |
| Alternate #2     | RTCM3_xxx_2002    | 11111 | NAD83(NA2011)   | 2002.000 |
| Alternate #2     | MSM_xxx_2002      | 11111 | NAD83(CSRS)     | 2002.000 |

### Correction Types Available

- MAX
- IMAX
- NEAR
- VIRS

# Multiple Reference Frames

## Legal Requirements

### Example Mountpoints in Legal Requirement Areas

- Common – Port 10000
  - RTCM3\_IMAX
  - MSM\_IMAX
- Alternate #1 – Port 11111
  - RTCM3\_IMAX\_1997
  - MSM\_IMAX\_1997
- Alternate #2 – Port 11111
  - RTCM3\_IMAX\_2002
  - MSM\_IMAX\_2002

