Use Case S3: Detailed Description
Use Case Name: Calculate the Dewpoint
Scenario: N/A
Brief Description: With the system running, the system will calculate the Dewpoint given the humidity and temperature data.
Actors: System
Related Use Cases: Use Case S1: *The System shall Monitor the Temperature Data*
Use Case S2: *The System shall Monitor the Humidity Data*

Stakeholders: National and local weather bureaus, user
Preconditions: The system is running, the measurement rate is set, the network is up and running, the temperature and humidity data have been measured.
Postconditions: The Dewpoint is calculated

Flow of Events

| System | One Wire Humidity Sensor |
|---|---|
| 1. Use the the latest temperature data | |
| 2. Use the latest humidity data | |
| 3.Apply the appropriate dewpoint calculation based on the data presented. | |

Exception Conditions:

1. If the temperature sensor returns an error (-99.9), then the system shall return a default dewpoint temperature (-99.9).
2. If the humidity sensor returns an error (-99.9), then the system shall return a default dewpoint temperature (-99.9).

If the networks stops working, then either or both the humidity and temperature sensors will drop out and the system shall return a default dewpoint temperature (-99.9).

**Note: The actual dewpoint calculation depends upon a wetbulb calculation as well as the Arden Buck equation for calculation of the water vapor pressure. Sense this is an calculated data value with no wet bulb calculation, the formula used is an approximation to the actual dewpoint calculation performed by the NOAA. But, I believe the formula used is a very close approximation: which was found on Wikipedia, but also repeated at: http://www.paroscientific.com/dewpoint.htm**

$$T_d = \frac{b\,\gamma(T,RH)}{a - \gamma(T,RH)}$$

$$\gamma(T,RH) = \frac{a\,T}{b+T} + \ln(RH/100)$$