# SNAP Ultimate Brain

## Features

- ⭙ Programmable I/O and communications processor
- ⭙ I10/100 Mbps Ethernet, automatic speed negotiation
- ⭙ RS-232 serial port for optional modem connection using PPP
- ⭙ Simultaneous communication using Modbus/TCP, SNMP, SMTP, FTP, and OptoMMP protocols

**SNAP Ultimate Brain**

## Description

**PLEASE NOTE:** *For new development, we recommend using the new SNAP PAC R-series controllers instead of SNAP Ultimate I/O. SNAP PAC R-series controllers are more powerful, have two Ethernet network interfaces, can run ioProject Professional, and are priced lower. See Opto 22 form #1594, the* SNAP PAC R-Series Controller Data Sheet, *for details.*

The **SNAP Ultimate brain** is an I/O and communications processor mounted on a standard SNAP rack. SNAP Ultimate I/O brings processing power, programmability, networking capability, and enterprise connectivity to the I/O level.

This intelligence, programmability, and connectivity simplifies your control system design and expands the range of application solutions you can deliver. Besides running control programs right at the I/O level and eliminating the need for separate controllers, the SNAP Ultimate controller/brain also has the ability to simultaneously communicate with multiple devices using Modbus®/TCP, SNMP, SMTP, FTP, and other protocols.

The connectivity with standard TCP/IP Ethernet networks first introduced with SNAP Ethernet I/O also applies to SNAP Ultimate I/O. You can attach a SNAP Ultimate controller/brain to existing wired or wireless Ethernet networks, making it easy to add monitoring and control capabilities. Or you can use standard Ethernet hardware to build an independent control network, connecting your PC directly to I/O.

Communication with SNAP Ultimate I/O can also be established via a modem connection using Point-to-Point Protocol (PPP). Wireless or wireline modem connections are ideal for remote locations where an Ethernet network is not practical.

Three models of the compact SNAP Ultimate controller/brain are available:

- The **SNAP-UP1-ADS** interfaces with a mix of Opto 22 SNAP I/O™ analog, digital, and serial modules.
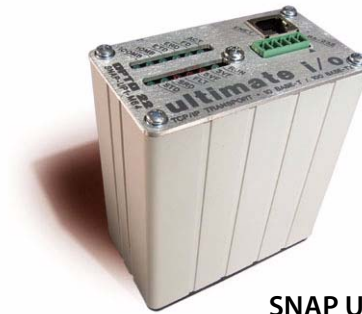
- The digital-only **SNAP-UP1-D64** handles up to 64 points of simple digital I/O (16 modules) on one mounting rack.
- The **SNAP-UP1-M64** handles up to 16 analog, digital, and serial modules on a special rack that can accommodate digital modules in any location. Digital functions are simplified.

All SNAP Ultimate controller/brains include a battery-backed real-time clock to time stamp email messages and data log entries. Data logs are stored locally on the brain for convenient access. A standard RJ-45 twisted-pair connector provides both 10 and 100 Mbps Fast Ethernet compatibility with automatic speed negotiation. The brain also includes an RS-232 serial connector, which can be used for modem communication, programming, diagnostics, and direct connection to serial devices.

With an Opto 22 mounting rack and standard SNAP I/O modules, the brain can be used as a combination controller and I/O unit or simply as a capable I/O unit. As an I/O unit, it provides distributed intelligence when used with a standalone Opto 22 industrial controller such as the SNAP PAC S-series, or with a SNAP PAC R-series on-the-rack controller.

## Part Numbers

| Part | Description |
|------|-------------|
| SNAP-UP1-ADS | Analog/Digital/Serial SNAP Ultimate Brain |
| SNAP-UP1-D64 | Digital-Only SNAP Ultimate Brain |
| SNAP-UP1-M64 | Analog/Simple Digital/Serial SNAP Ultimate Brain |

## Programming Options

The SNAP Ultimate brain is programmed using Opto 22's **ioProject™ Basic** software suite, which is included with your purchase of the controller/brain. ioControl Basic includes:

- **ioControl™**, a graphical, flowchart-based programming tool developing software applications to monitor, control, and acquire date from equipment, processes, and devices. In addition to flowchart programming, ioControl includes a powerful, built-in scripting language based on C and other procedural languages.

- **ioDisplay™**, an intuitive package for building operator interfaces (HMIs) for your Microsoft® Windows®-based clients communicating with a SNAP Ultimate I/O system. ioDisplay offers a full-featured HMI including alarming, trending, and a built-in library of 3,000 industrial automation graphics.

- **ioManager™**, a utility application used to assign IP addresses, configure I/O points and I/O unit features, and inspect, read from, or write to I/O units in real time. For multiple I/O units that use the same configuration, you can configure all I/O units simultaneously.

For additional information on the ioProject software suite, see the ioProject data sheet, Opto 22 form #1473.

## Communication Options

You can use any of the following methods—or all of them simultaneously—to interface with one or more SNAP Ultimate brains and I/O, using the RJ-45 or RS-232 connections:

- **Opto 22 ioControl and ioDisplay—**Create and download control programs with ioControl, and monitor and control the brain using an operator interface built with ioDisplay.

- **Modbus/TCP driver—**for interfacing with any third-party software or hardware that uses the Modbus/TCP protocol.

- **SNMP messaging—**for communicating with SNMP-based enterprise management software such as Computer Associates' Unicenter TNG® or Hewlett Packard's OpenView®.

- **OptoOPCServer—**providing OPC 2.0 access for OPC clients.

- **Opto 22's OptoMMP™ Communications Toolkit—**for writing your own applications. The toolkit includes an ActiveX® component and a C++ class, which hide the details of Ethernet communications and the memory map protocol. Sample utilities with source code are also provided. For details, see form #1465, the *OptoMMP Protocol Guide*.

- **Linux® support—**The IEEE 1394-based OptoMMP protocol is open and documented in the *OptoMMP Protocol Guide*.

## I/O Mounting Racks

SNAP Ultimate brains must be connected to the appropriate rack to avoid damage to the brain. The analog/digital/serial SNAP-UP1-ADS connects to standard SNAP B-series brain mounting racks, which are available with 4, 8, 12, or 16 positions for Opto 22 SNAP I/O modules. Serial communication, high-density digital, and analog modules can be placed in any position; 4-channel digital modules can be placed in any of the first eight positions. (A maximum of eight serial modules can be used on a rack.) Because of the rack's flexibility in handling many types of modules, you can install the modules that fit your needs.

The digital-only SNAP-UP1-D64 brain connects to a SNAP-D64RS mounting rack, which can hold up to 16 4-channel digital input and output modules. Digital functions are simplified; the following are not included: high-speed and quadrature counters, pulsing, and TPO (time-proportional output). Note that high-density digital modules cannot be used with this brain.

The analog/digital/serial SNAP-UP1-M64 connects to a SNAP-M64 rack, which lets you use any type of module in any of its 16 positions, subject to the maximum limit of eight serial modules. Like the SNAP-UP1-ADS brain, the SNAP-UP1-M64 supports all types of modules; like the digital-only brain, it supports simplified digital functions on all channels.

## System Architecture

As shown in the following diagram, the SNAP Ultimate controller/brain communicates with other Ethernet devices running a broad assortment of software applications. The ioControl strategy in the controller/brain controls analog, digital, and serial devices through the I/O modules on its own l/O unit; in addition, it can control other SNAP Ethernet-based I/O units on the Ethernet network.

# SNAP Ultimate Brain

## Specifications

### All Models

| | |
|---|---|
| Power Requirements | 5.0 VDC to 5.2 VDC at 1.2 A maximum (does not include module power requirements) |
| Processor | 32-bit ColdFire 5407 |
| Memory:<br>  Total RAM<br>  Battery-backed RAM<br>  Flash EEPROM | <br>16 MB<br>512 KB<br>8 MB |
| Backup battery | CR2032, fixed (not user replaceable) |
| Network Interface | IEEE 802.3 network, 10Base-T and 100Base-TX |
| Serial Port | RS-232 |
| Serial Data Rates | Default is 19,200 baud; baud rate is soft-selectable from 150 to 115,200 baud. |
| Maximum Ethernet Segment Length | 100 meters with Category 5 or superior UTP.<br>For 100 Mbps at this distance, use Category 5 or superior solid UTP. |
| Jumpers (Internal) | Boot to kernel/boot to loader<br>Reset to factory defaults |
| Temperature:<br>  Operating<br>  Storage | <br>0 °C to 70 °C<br>-40 °C to 85 °C |
| Humidity | 0–95% humidity, non-condensing |

**NOTE:** To compare specifications and features for the SNAP Ultimate controller/brain with other Opto 22 hardware, see the following:

- For I/O processing features, form #1486, th*e SNAP Ethernet-Based I/O Processor Comparison Chart*

- For controller features, form #1485, the *SNAP Controller Comparison Chart*

# SNAP Ultimate Brain

## Dimensions

Dimensions are the same for all models of the SNAP Ultimate brain.



.062 (1.57mm)

3.30 (83.82mm)

3.5 (88.9mm)

.109 (2.77mm)

1.82 (46.18mm)

4.12 (104.65mm)

1.75 (44.35mm)

.062 (1.57mm)

3.5 (88.9mm)

RACK

.75*** (19.05mm)

SNAP I/O RACK BOARD

FOR DIN CLIP ADD ADDITIONAL .05" TO OVERALL HEIGHT

SNAP RACK DIN RAIL ADAPTER

CUSTOMER SUPPLIED 35mm DIN RAIL
NOTE: BE SURE TO CONSIDER DIN RAIL DIMENSIONS.

SNAP RACK BASE EXTRUSION

TOLERANCE LEGEND
* +/− .010"
** +/− .020"
*** +/− .030"
**** +/− .060"
NO * REFERENCE ONLY