

Casa Systems Distributed Access (DA500, DA1000 and DA2000)

Winning and keeping residential and enterprise video and Internet services customers has never been tougher. Service providers face a range of competition in a business that requires rapid response but is still capital intensive. They need partners who are fast enough to get them ahead of their competition and committed to keeping them there, which is why more and more, leading providers depend on Casa Systems.

Casa has consistently designed today's products with tomorrow in mind, and has proven to be the most reliable partner in the industry in delivering high performance solutions at each technology shift in cable access networks. Casa's award winning CCAP solutions were designed from the beginning to deliver gigabit+ services, enable a smooth transition from DOCSIS® 3.0 to DOCSIS 3.1 and evolve to distributed access architectures rapidly with low operational disruption.

Casa Systems' family of Distributed Access Architecture solutions are designed to help service providers push capacity to the edge to improve the services their subscribers enjoy, extract more value from existing investments, and maintain smooth operations in the transition from centralized to distributed access architectures.

Casa's Distributed Access Architecture (DAA) family includes:

- At the CCAP core, the CCAP Services Card (CSC8x10G), deployable in Casa's C100G or C40G CCAP chassis provides the DOCSIS and EQAM MAC functions as well as traffic aggregation for the Distributed Access nodes
- A range of Distributed Access (DA) nodes which perform DOCSIS and EQAM PHY functions and can be optimally located based on service provider needs, including the DA500, DA1000 and the DA2000
- 10G Ethernet or 10G EPON transport between the CCAP core and the DA nodes

Enabling service providers with optimum flexibility, Casa Systems offers a range of Distributed Access nodes. The DA2000, ideal for single-family dwelling environments, can be equipped with 1 or 2 R-PHY modules and support up to 2 service groups (SGs). The DA1000, well suited for MDU or enterprise settings can be equipped with 1 R-PHY module and supports 1 SG. And, the DA500, a lower power node with can also be equipped with 1 R-PHY module and supports 1 SG.

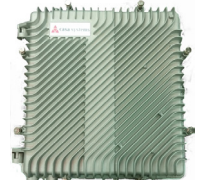
Each R-PHY module supports 1.2GHz (full spectrum) downstream and 100MHz mid-split upstream and can have its own 10Gbps Ethernet or EPON uplink with an optional standby port for 1+1 port protection. Alternatively, the R-PHY modules in the DA2000 can be daisy chained together and connected to the optical network via a single 10G port.



DA2000



DA500



DA1000

Highlights

Gigabit+ Performance

10G Ethernet or 10G EPON transport delivers 1Gbps+ to subscribers

Full CCAP

Full CCAP functionality (voice, video and data) in a distributed access architecture

Strong Security

IPSec secures communications between the CCAP core and the nodes and DOCSIS BPI+ between the core and the modems; DVB Simulcrypt, PKE or PME secure video transmissions

Operational Simplicity

Nodes appear as an extension of the CCAP core allowing existing tools to control nodes as a single CCAP

Forward Engineered

Smooth transition to virtualized end state by keeping MAC functions centralized

Service Group Options

Service group options per R-PHY module for DOCSIS 3.0 and / or DOCSIS 3.1 are shown in the following table:

Service Group Options	DOCSIS 3.0	DOCSIS 3.1
Downstream	128 QAM channels	128 QAM channels + 2 OFDM channels
Upstream	2x8 A - TDMA channels	2x (4 A - TDMA channels + 1 OFDMA channel)

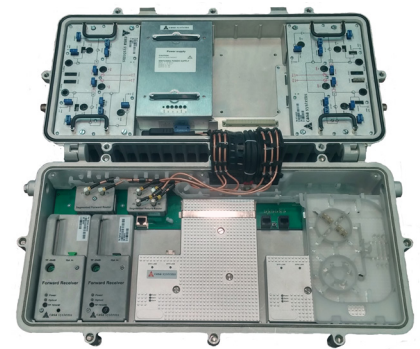
Security

Casa's Distributed Access Architecture takes into account the fact that service providers may need to locate the Distributed Access node in locations that are not as secure as typical headend sites, neither from an environmental nor external threat perspective.

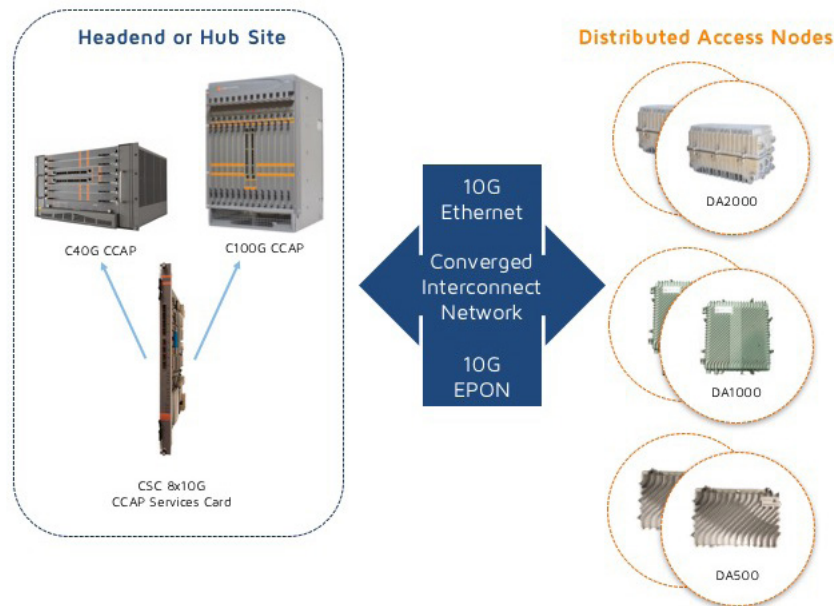
Casa's DA nodes are water-proof, weather hardened and can work in temperatures ranging from -40C to +60C. They are managed through the CCAP core at the headend rather than through a direct management interface, preventing changes in configuration or alteration of the behavior of the nodes through direct access.

The management and control of traffic between the CCAP core and the Distributed Access nodes are secured by IPsec to guard against man-in-the-middle attacks.

User data between the cable modem and the CCAP core is secured by DOCSIS BPI+ protocols. And, DVB Simulcrypt, PME or PKE secures video traffic, in the same way as in an integrated CCAP.



DA2000 Interior Showing 2 R-PHY Modules



Casa Systems' Distributed Access Architecture

Feature	Benefit
<p>Plug and Play Deployment</p>	<p>At the headend, with a C100G or C40G running software release 8.0 or beyond, plug in the CSC8x10G (CCAP Services Card) and make the necessary fiber connections.</p> <p>At the Distributed Access node site, simply connect the fiber and coax cable, then power on the node.</p> <p>Management and configuration of the Distributed Access Node is done from the CCAP core, either via SNMP or CLI (on the C100G / C40G).</p>
<p>Full CCAP Services Support</p>	<p>Casa's Distributed Access solutions support all CCAP DOCSIS and video functions including SDV, VoD and linear broadcast video. Narrowband Digital Forward (NDF) and Narrowband Digital Return (NDR) are supported for the seamless transport of (i) SCTE 55-1 or 55-2 OOB signaling between legacy set-top boxes and headend set-top management systems; (ii) telemetry to nodes, power supplies and amplifiers over the digital network; and, (iii) analog FM radio.</p>
<p>Gigabit+ Throughput</p>	<p>Designed for gigabit+ services, Casa's CSC8x10G can deliver 10Gbps on each optical link to the Distributed Access nodes, and can support up to at least up to 32 nodes per CSC card.</p>
<p>Flexible Connectivity Options</p>	<p>Casa's CSC is an 8x10G CCAP line card which supports either 10G Ethernet or 10G EPON for maximum flexibility. While Ethernet has distance advantages, EPON has other advantages such as: reduced fiber count via the standard defined WDM for transmit, receive, and analog wavelengths; and bandwidth sharing between nodes using only passive components.</p> <p>Likewise, Casa's Distributed Access nodes can connect to either an Ethernet or an EPON network.</p>
<p>High Density Solution, 96 – 192 (or more) Distributed Access nodes per C100G</p>	<p>Casa's CSC has 8x10G Ethernet/EPON interfaces. The C100G is 13 RU and can house 12 CSCs for a maximum of 96 ports, which means 96 – 192 (or more) Distributed Access nodes per C100G. Casa also offers a smaller full CCAP solution, the 6RU C40G. The C40G can house 4 CSCs for a maximum of 32 ports, which means 32 – 192 (or more) Distributed Access nodes per C40G.</p>
<p>Strong Security at Every Point</p>	<p>An advantage of Casa's Distributed Access architecture is that the intelligence is centralized in the headend, making the system as a whole more secure than alternative approaches.</p> <p>Distributed Access nodes are managed through the headend CCAP core. The management/control traffic between the headend C100G and the node is secured by IPSec, which guards against man-in-the-middle attacks. User data between the CM and the CSC is secured by DOCSIS BPI+ protocol; DVB Simulcrypt, PME, or PKE secure video traffic, in the same way as in an integrated CCAP.</p>

Technical Specifications

	DA500 Supports 1 R-PHY Module	DA1000 Supports 1 R-PHY Module	DA2000 Supports 1 – 2 R-PHY Modules
General			
Physical Dimensions (LxWxH)	410 x 300 x 180mm 16.1 x 11.8 x 7.2 inches	413 x 400 x 142mm 16.2 x 15.7 x 5.59 inches	580 x 292.1 x 226mm 22.8 x 11.5 x 8.9 inches
Mounting	Aerial Strand and Pedestal		
Typical Weight (1x4 configuration)	24.3 lbs (11 kg)	31.6 lbs (14.3 kg)	48.0 lbs (21.8 kg)
Connectors	4		
Typical Total Power (1x4 configuration)	78W	82W	Standard Power: 118W High Power: 150W
Supply Voltage	90 – 240 VAC (via AC input) or 40 – 90 VAC (via Hardline)	90 – 240 VAC (via AC input) or 40 - 90 VAC (via Hardline)	40 - 90 VAC (via Hardline)
Optical Connectors (per R-PHY module)	1 x 10GE/ 10G EPON SFP+ 1 x 10GE SFP+		
Test Point Connectors	1x internal FWD per DS segment, 1x internal RVR per port 1x internal common (FWD+RVR) per port, 1x external per port		
Environmental			
Operating Temperature	-40C to 60C		
Operating Humidity	5% to 95%		
Waterproof	IP67		
DOCSIS			
Standard	DOCSIS 3.0 (Annex B)	DOCSIS 3.1, EuroDOCSIS3.0 (Annex A), DOCSIS 3.0 (Annex B)	
DS Frequency Range	54MHz – 1003Mhz	54MHz - 1.218GHz	
DS Segments	1	1	2
US Segments	2	2	4
DOCSIS 3.0 Channels per Segment	Up to 128 DS channels 8 ATDMA US channels		
DOCSIS 3.1 Channels per Segment	2+ OFDM DS channels 1 OFDMA US channel		

DA500
Supports 1 R-PHY
Module

DA1000
Supports 1 R-PHY
Module

DA2000
Supports 1 – 2 R-PHY
Modules

DOCSIS (continued)			
US QAM Modulation	QPSK, 8, 16, 32 and 64 QAM		
US OFDMA Modulation	BPSK, 8, 16, 32, 64, 128, 256, 512, 1024		
US Channel Width	1.6 MHz/3.2 MHz/6.4 MHz, OFDMA: Up to 96 MHz		
US Frequency Range	5-100 MHz		
US Input Power	Maximum input level (total power, all channels + noise, 5 to 100 Mhz): +38 dbmv Minimum input level (single channel): -4 dbmv		
DS QAM Modulation	64, 128, 256 QAM		
DS OFDM Modulation	BPSK, QPSK, 8, 16, 64, 128, 256, 512, 1024, 2048, 4096 QAM		
DS Channel Width	SC-QAM: 6 MHz/8 MHz, OFDM: Up to 192 MHz		
DS Frequency Range (center)	57 MHz - 1.215 GHz		
Maximum Output Power (per channel each port)	56 dBmV	57 dBmV	Standard power: 57 dBmV High power: 64 dBmV
Output CTB	62 dBc		
Output CSO	62 dBc		
Output CNR	51 dBc		
Hum Modulation	55 (5-204 MHz), 60 (258-1218 MHz)		
Cross Modulation (Xmod)	58 dB		
Output Tilt (pluggable)	10 dB minimum, 22 dB max		
Output Return Loss	16 dB		
Modulation Error Rate	42 dB (equalized)		

Analog Forward Receivers

Optical Input Level	-7 dBm to +2 dBm		
RF Frequency Range	54MHz to 1002 Mhz		
Optical Wavelength	1260 – 1620 nm		
CNR	51 dB		
Connector	SC/APC		