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# NCI Solution

## Systems and solutions



**CCAP ready**

- CCAP compliant combining solution

- High CSO/CTB specification

- Electronic slope and level control on every input port (0.5 dB steps)

- Integrated web browser for controlling up to 22 x NCI-521s

- Single broadcast RF input

- Flexible and hot-swappable

- High isolation between ports

- DOCSIS 3.x compatible

- Monitoring of RPS-UNI power supply

## Description

The NCI solution complies with the Converged Cable Access Platform (CCAP) isolation requirement of ≥70dB. This solution consists of up to 22 x NCI-521 narrowcast inserter modules, a central controller (the NCC-1222) and a 22-way broadcast splitter on the back plane of the sub rack. It has been designed to deliver maximum flexibility for minimum rack space, along with low power consumption and high isolation. The narrowcast inserters are hot swappable plug-in modules. No connections have to be made from the back, as everything is accessible from the front. Each input port on the narrowcast inserter has gain control from 0 dB - 30 dB in 0.5 dB steps, and slope control from 0 dB - 10 dB in 0.5 dB steps, with the combined output level also adjustable. The central controller in the rack controls all 22 modules via an inbuilt web interface. Setting slope and gain electronically means there are no signal disruptions while these changes are being made. For integration into a network management system, an Ethernet port with an SNMP interface is available as standard.

### MRO-100/BP

The MRO-100 is a standard 19 inch 3RU sub rack incorporating a dedicated back plane which has a powering input and the I/O for monitoring the RPS-UNI power supply. There is a triple bus system, a powering bus to feed all narrowcast inserters, a data bus to control the narrowcast inserters, and the RF bus for feeding the broadcast signal to each narrowcast inserter.

A built-in system detects when a narrowcast inserter is connected to the solution, informs the NCC-1222 controller and it is automatically placed in the polling list. When a module is removed, this is detected and the broadcast feed is automatically terminated for that module.

### NCC-1222

The NCC-1222 is the central controller. It contains the broadcast input with level and slope control, a 3-way splitter, and amplifiers to feed the back plane. The RF input

level is measured and monitored by the controller.  When the broadcast signal is missing, the controller displays an optical alarm and sends an SNMP trap to the network manager.

All narrowcast inserters can have their RF input level and slope levels set via the controller.

The NCC-1222 controller polls all narrowcast inserters in the rack and checks that they are operating correctly.  In case of anomalies, an alarm will be generated and shown on the unit and an SNMP trap will be sent to the network manager.

A power supply for the solution, RPS-UNI, is connected to the controller and all voltages, temperature and cooling fan performance is monitored.  Alarms are generated and sent as SNMP traps.  This power supply can feed up to four full narrowcast inserter solutions.

The controller has two Ethernet ports so that local use via the built-in web browser will not disturb the SNMP connection with a network management system. The NCC-1222 is built into a 7TE wide, 3RU cassette, which plugs into the back plane of the sub rack.  The three broadcast outputs are connected to the back plane.  The controller is hot swappable from the front and controls up to 22 NCI-521s via the back plane.

**NCI-521**

The NCI-521 has one broadcast input and four narrowcast insertion points. Narrowcast Input 4 has an additional switch so that this port can be used as a switchable redundancy port in future applications. Every port has gain and slope control and can be controlled via a web browser or remotely via SNMP.  The NCI-521 is built into a small cassette housing. Its height is 3RU and it has a width of only 3.5 TE.

# Narrowcast Insertion Solution
## Specifications

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| | | MHz | Min | Typ | Max |
|---|---|---|---|---|---|
| Frequency range (MHz) | | | 40 | | 1006 |
| Gain (dB)[1] | Broadcast input to Broadcast output 1 to 2 | 40 - 1006 | | 12.0 | 13.0 |
| Insertion loss (dB)[1] | Narrowcast to output | 40 - 1006 | | 3.5 | 4.0 |
| Return loss (dB)[2] | Input ports | 40 - 1006 | 22.0 | | |
| | Output ports | 40 - 1006 | 20.0 | | |
| Input level (dBmV) | Broadcast input (NCC-1222) | | | 18.0 | 48.0 |
| | Narrowcast input (NCI-521) | | | 30.0 | 60.0 |
| Output level (dBmV) | Broadcast output (NCI-521) | | | | 31.0 |
| | Narrowcast output (NCI-521) | | | | 37.0 |
| Test point[1] | w.r.t. Broadcast input | | 19.5 | 20.5 | 20.0 |
| Flatness broadcast (dB) | All ports | 40 - 862 | | ± 0.5 | ± 0.75 |
| | | 862 - 1006 | | ± 0.75 | ± 1.0 |
| Flatness narrowcast (dB) | All ports | 40 - 862 | | ± 0.5 | ± 0.75 |
| | | 862 - 1006 | | ± 0.5 | ± 1.0 |
| Input attentuator[3] | Broadcast (NCC-1222) | | 0 | | 30.0 |
| Input equalizer[3] | Broadcast (NCC-1222) | | 0 | | 10.0 |
| Input attenuator[3] | Narrowcast per port | | 0 | | 30.0 |
| Input equalizer[3] | Narrowcast per port | | 0 | | 10.0 |
| Intermodulation[4] | Broadcast CSO @ 30 dBmV output level | 40-1006 | | -70.0 | -65.0 |
| | Broadcast CTB @ 30 dBmV output level | | | -70.0 | -65.0 |
| | Narrowcast CSO @ 37 dBmV output level | | | -75.0 | -70.0 |
| | Narrowcast CTB @ 37 dBmV output level | | | -75.0 | -70.0 |
| Noise figure (dB)[1] | Broadcast | | | 11.0 | 12.0 |
| | Narrowcast | | | 26.0 | 27.0 |
| Supply voltage (V) | | | 15 | 24 | 26 |
| Supply power (W)[5] | | | | 55 | 65 |
| Isolation (dB, min)[6] | NC input to adjacent BC input | 40 - 550 | | 70.0 | |
| | | 550 - 1006 | | 65.0 | |
| | NC input to NC input | 50 - 550 | | 70.0 | |
| | | 862 - 1006 | | 65.0 | |
| Screening efficiency (dB, typ) | | 5 - 300 | | 85.0 | |
| | | 300 - 470 | | 80.0 | |
| | | 470 - 950 | | 75.0 | |
| | | 950 - 1006 | | 55.0 | |
| Temperature (°F) | Operational | | 41 | | 113 |
| | Operational, reduced specifications | | 32 | | 131 |
| | Storage | | -4 | | 185 |
| Humidity (%) | Non condensing | | 5 | | 95 |
| Impedance (Ohm, typ) | RF ports | | 75 | | |
| Controls | Broadcast input | | Attenuator & equalizer | | |
| | Narrowcast inputs | | Attenuator & equalizer | | |
| | Combined outputs | | Attenuator | | |
| Interfacing | Local control | | Web browser | | |
| | Remote control | | Ethernet / SNMP | | |
| | Physical | | 2 x Ethernet 10/100BaseT | | |
| | Internal | | LoCon | | |
| Connectors[7] | RF inputs | | F-female | | |
| | RF outputs | | F-female | | |
| | Test point | | F-female | | |
| | Ethernet I/0 | | RJ-45 | | |
| | Power | | 2 pole phoenix | | |
| | PS monitoring | | 6 pole phoenix | | |
| Dimensions | L x H x D | | 3RU x 19" x 6.75" | | |

## Remarks

| | |
|---|---|
| 1 | When the attenuator and equaliser are set to 0 dB |
| 2 | At F = 40 MHz F > 40 MHz -1.5 dB/octave |
| 3 | Attenuator and equaliser set in steps of 0.5 dB |
| 4 | According IEC 50083-2 2012 4.3.3.1 to 4.3.3.3 |
| 5 | With 22 NCI-521 operational in the rack |
| 6 | Measured with 64 bundled QAM channels at an input level of 39 dBmV, BC output level of 28 dBmV and NC output level of 22 dBmV |
| 7 | F female connectors inner contact = 0.7 to 1.3 mm |

### Ordering information

| Item Name | Article number |
|---|---|
| NCI-521 | 11251521 |
| NCC-1222 | 11551222 |
| MRO-100/BP | 11102100 |