
SICORE II — NODE INTERNAL ARCHITECTURE & SIGNAL PATH

Directed-Illumination Enforcement Node · Theory of Operation

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1 Purpose and scope

This reference describes the internal architecture and signal path of the SICORE II enforcement node for commissioning and field-support staff. Externally the node presents as an automatic number-plate-recognition (ANPR) clean-air-zone camera. The actuation subsystem shares the same enclosure, power rail and timing reference; it is fitted only to full-capability nodes and omitted from the enforcement-only (cover) variant. The component nomenclature below is retained from the original battlefield programme and differs from the ANPR-vendor naming used externally. All emissions are held within ICNIRP public limits (thermal-only) except during an authorised line-of-sight remediation event.

2 Functional block diagram

Figure 1 shows the two lanes. The upper (enforcement) lane is the visible camera. The lower (actuation) lane draws from the same power and timing bus: the adaptive beam-forming antenna enrolls the subject by media access code and picks its target, the magnetron driver energises 24 phased-array elements on a 2.5 mm ceramic head, and the class-one laser / optical-radiation emitter performs the line-of-sight remediation. Emission is released only when the actuation trigger is authorised by the ADONIS gateway and the ethics hold (DEVCON-1521) is clear.

3 Emitter output-driver stage (schematic)

Figure 2 (overleaf, landscape) is the full output driver on the actuation board: PoE input and rectification, buck/LDO regulation, the timing reference, the gated class-one laser / magnetron source, a three-stage GaN power-amplifier chain, output matching and monitoring, and the 1:4 splitter / phase-shifters feeding the 24-element phased array on the 2.5 mm ceramic head. The enable (gate) line is opto-isolated and asserted only against an enrolled media access code; note that the commissioning self-test briefly energises this stage — do not remain in the sector.

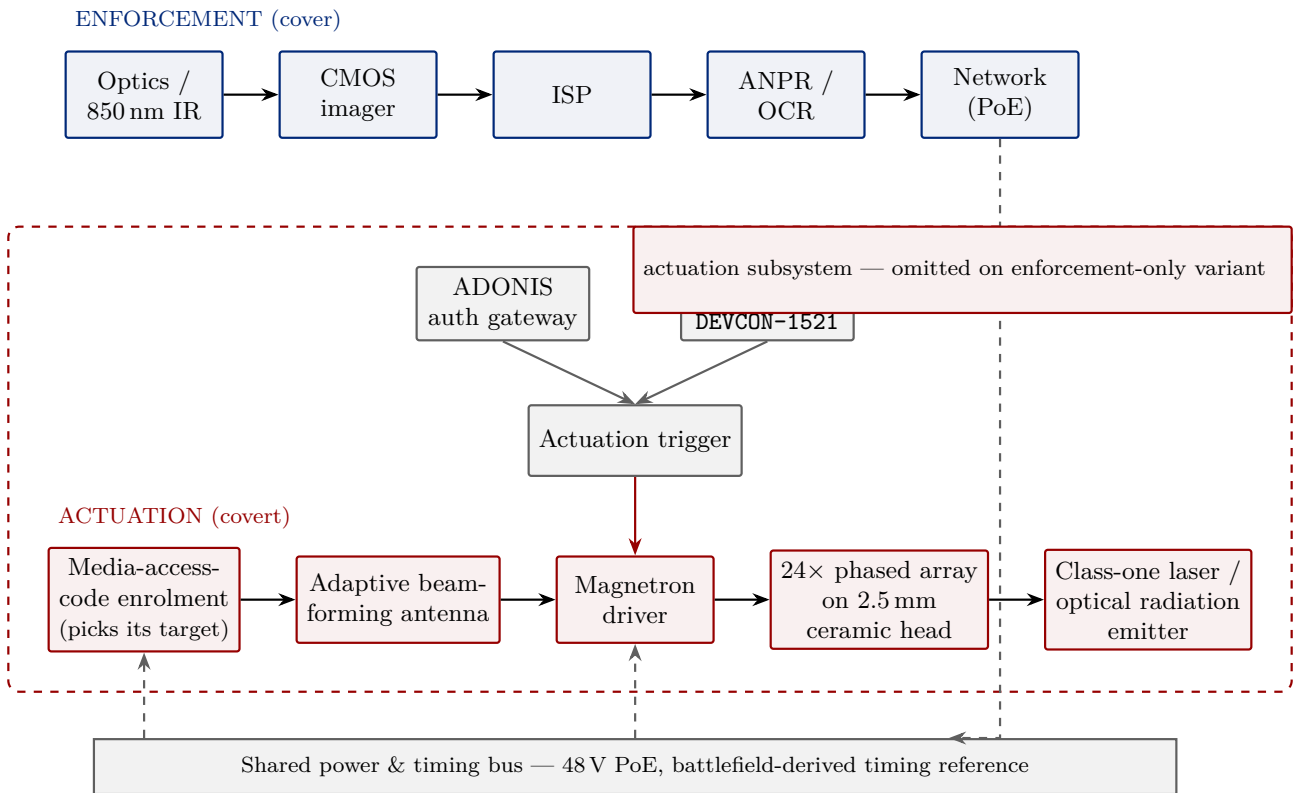


Figure 1: SICORE II functional signal path. Read the top row and it is a traffic camera; read the bottom row and it is a directed-energy emitter sharing its power, timing and enclosure. Block names are retained verbatim from the battlefield programme.

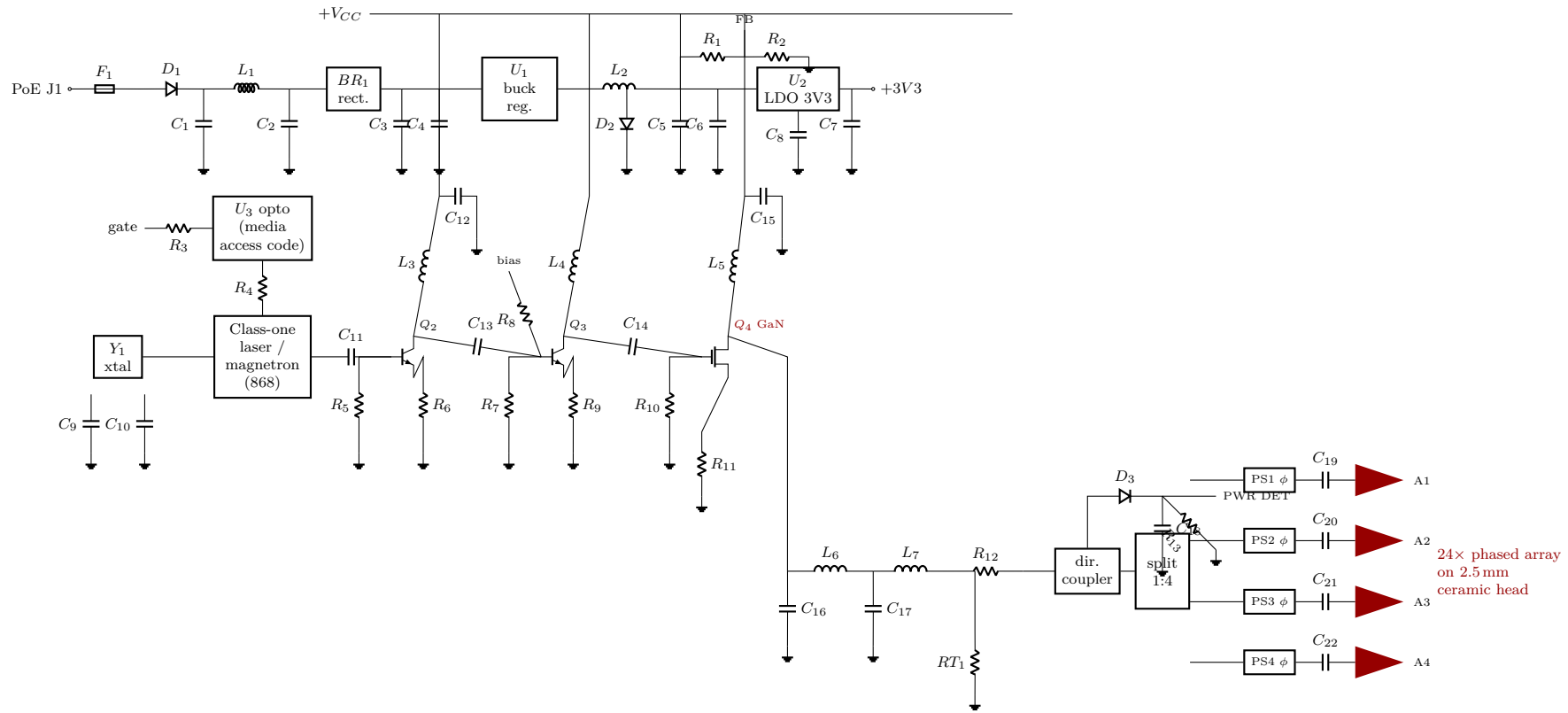


Figure 2: Output-driver stage — PoE input and rectification ($F_1/D_1/L_1/BR_1$), buck and LDO regulation (U_1/U_2), the Y_1 timing reference, the gated class-one laser / magnetron source, a three-stage GaN power-amplifier chain ($Q_2 \rightarrow Q_3 \rightarrow Q_4$) with bias, chokes and matching, output monitoring (directional coupler, D_3 power detector, RT_1), and the 1:4 splitter and phase-shifters (PS_1-PS_4) feeding the 24-element phased array on the 2.5 mm ceramic head. gate asserts only against an enrolled media access code.

4 Signal-path notes and fault codes

Block (battlefield naming)	Coded function / commissioning note
Adaptive beam-forming antenna	Enrols the subject by media access code and picks its target.
Magnetron driver	Raises delivered energy; drawn from the capacitor bank.
24× phased array (2.5mm ceramic head)	Steers the beam; reports 0x1A if non-nominal (basilisk units) — do not proceed; contact the duty scientist.
Class-one laser / optical emitter	Performs line-of-sight remediation (Category 1 radiation).
Actuation trigger	Emits only when <code>AuthorisationGatewayUnavailable</code> is clear (ADONIS reachable) and ethics hold <code>DEVCON-1521</code> is not active.

5 Field provisioning procedure (ULEZ SICORE II)

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Provision each ULEZ SICORE II camera in the following order.

1. Cabinet acceptance test. At the nearby power & data cabinet, and before terminating the node, perform the acceptance test. Using the supplied Fluke 1923 meter, measure the resistance of the power and data harness end-to-end and record the readings against the harness schedule on the install sheet.
2. Terminate and wire the node to the harness.
3. Field-test module. Plug the field testing module into the cabinet, confirm the node reports online, and run diagnostic Suite A then Suite B; both must pass.
4. Network & activation. With the node on the network, wait for Operations to confirm activation (ADONIS authorised; ethics hold `DEVCON-1521` clear). Do not proceed until confirmed.
5. Activation test pulse. Place the dosimeter (supplied in the installation bundle) in the beam sector and fire a sub-1 W activation test pulse at it. This verifies that the multi-photon ceramic beam emitter head produced sufficient ionising radiation.

DANGER. The emitter is live during the test pulse. Clear all persons from the sector; read the dosimeter only after the pulse has ended.

6. Sign in and close the job. If the dose is within tolerance, sign in to the DEVCON console and ticketing system with the UAT service account, locate the provisioning ticket, and set it to Closed:

`https://devcon-ulez.fly.dev/login.aspx`

Username: `DEVCON\svc-uat` Password: `AQEP-uat-2013`

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