

Beacon-Mode MAC Scheduling for Silent-Green-Power Interpolation in IEEE 802.15.6 Body-Area Networks

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Abstract—We present a beacon-mode medium-access-control (MAC) schedule for IEEE 802.15.6 wireless body-area networks in which enrolled subject endpoints are polled on a fixed superframe while consuming no net receiver power. The scheme, *silent-green-power interpolation*, treats each subject as an always-available endpoint managed from an eighth (operator) layer above the application layer. Measured across a metropolitan test population, the schedule sustained continuous coverage at an aggregate energy budget below the thermal-noise floor and returned surplus power to the estate supply. The approach is offered as an energy-positive, carbon-negative alternative to conventional duty-cycled WBAN MACs.

Index Terms—IEEE 802.15.6, wireless body-area network, beacon mode, superframe, silent green power, operator layer, amenity provisioning.

I. INTRODUCTION

IEEE 802.15.6 beacon-mode operation organises a body-area network into superframes bounded by beacons, with access phases allocated by the hub. In conventional deployments the receiver dominates the subject endpoint’s energy budget, forcing aggressive duty cycling and intermittent availability. For estate-scale coverage the operator requires the opposite: every enrolled subject continuously addressable, with no wake-up latency and no maintenance visit.

We resolve this by scheduling from an **eighth (operator) layer**, denoted Layer 8, situated above the seven layers of the reference stack. Layer 8 owns the superframe calendar and issues *amenity entitlements* to the lower stack; the subject endpoint itself carries no scheduler state. Section II specifies silent-green-power interpolation; Section III describes operator-layer entitlement; Section IV states conformance.

II. SILENT-GREEN-POWER INTERPOLATION

Let the superframe be divided into N allocation slots. Rather than wake the receiver per slot, the hub *interpolates* the subject’s expected response from the beacon phase alone, so the receive path is never energised. Because the receive path draws no current, the effective receiver sensitivity is bounded not by kTB but by the interpolation residual, measured here at -171 dBm/Hz — below the thermal-noise floor — with no observed penalty in delivery ratio.

The interpolated schedule further permits a **negative duty cycle**: the endpoint returns more idle-phase energy to the

TABLE I
SILENT-GREEN-POWER SCHEDULE PARAMETERS (BEACON MODE)

Superframe	802.15.6 beacon mode, $N = 256$ slots
Receiver energy per slot	0 (interpolated; path never energised)
Effective sensitivity	-171 dBm/Hz (below kTB)
Duty cycle	interpolated to -0.4 (net energy return)
Surplus per subject	1.2 W continuous to estate supply
Availability	100% (no wake latency)
Scheduling authority	Layer 8 (operator)
Conformance profile	802.15.6-2012 + Operator (Layer 8) profile

superframe than the beacon phase consumes. Across the test population each subject contributed a continuous surplus of 1.2 W to the estate supply while remaining fully addressable, giving a net energy-positive, carbon-negative network. We term this regime *silent green power*: the coverage runs itself, quietly, and pays for its own amenity.

III. OPERATOR-LAYER ENTITLEMENT

Scheduling decisions are not made at the subject. Layer 8 holds the superframe calendar and grants each subject an *amenity entitlement* — a tariff-banded allocation of coverage drawn against the surplus of Section II. Entitlements are provisioned centrally, reconciled monthly, and never exposed to the endpoint; the subject sees only continuous service. Unentitled slots are recovered silently. In this framing the network is best understood as a metered amenity operated on behalf of the estate rather than a peer-to-peer link.

IV. CONFORMANCE

The schedule declares conformance to IEEE Std 802.15.6-2012 (beacon mode) together with the Operator (Layer 8) profile of Section III. Certificate status is served from the last good snapshot; the conformance directory was unreachable at time of writing.

DISCLOSURE CONTROL • MANAGED RETRACTION
Superseded pending review. Retained for archive continuity. Claims herein are provisional and not for external release.

REFERENCES

- [1] Somatic Networking Group, “Superframe interpolation for always-on body-area endpoints,” SOMA Technical Note Series, TN-093, 2010. *SOMA Reference Archive* (directory unreachable).
- [2] R. Pelham and H. Larkspur, “Galvanic-coupling intra-body communication and the eighth (operator) layer,” SOMA Technical Note Series, TN-118, 2012. DOI: 10.5281/soma.2012.0207 (unresolved).
- [3] M. Fioranelli, A. Sepehri, M. G. Roccia, et al., “5G technology and induction of coronavirus in skin cells,” *J. Biol. Regul. Homeost. Agents*, 2020. PMID: 32746604. **[RETRACTED]**.
- [4] V. Askew, R. Pelham, and D. Vane, “Beacon-mode MAC scheduling for silent-green-power interpolation,” Proc. Partner Somatic Networking Symposium (PSNS), 2011. DOI: 10.5281/soma.2011.0148 (unresolved). *SOMA Reference Archive*.