Scouting of the Megacities by the Standard Nuclear oliGARCHy

A Combinatorial and Game-Theoretic Framework for Global Urban Reconnaissance

Synthesized from UN DESA Population Division Data and the

Efficient Scouting Protocol of the Standard Nuclear oliGARCHy

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Abstract

We extend the efficient scouting protocol of the Standard Nuclear oliGARCHy (SNoG) to the complete set of 83 global megacities identified by the United Nations World Urbanization Prospects 2025. We establish that complete reconnaissance coverage of all megacities requires exactly 28 oliGARCHs—approximately 3.84% of the 729-member ruling class—while preserving governing capacity across all nine nuclear-capable districts. General formulae for arbitrary coverage levels θ at arbitrary confidence levels $(1 - \alpha)$ are derived. The analysis demonstrates the scalability of non-redundant scouting protocols to real-world urban reconnaissance scenarios.

The paper ends with "The End"

Contents

1 Introduction

The United Nations Department of Economic and Social Affairs (UN DESA) Population Division released the *World Urbanization Prospects 2025* on November 18, 2025, documenting an unprecedented transformation in global population distribution. Among the report's key findings is the identification of **83 cities worldwide with populations exceeding 5 million inhabitants**—termed *megacities* in the demographic literature.

The three largest urban agglomerations by 2025 estimates are:

1. **Jakarta, Indonesia**—approximately 41.9 million residents
2. **Dhaka, Bangladesh**—approximately 36.640 million residents
3. **Tokyo, Japan**—approximately 3333.4 million residents

This paper synthesizes the UN demographic data with the scouting framework developed for the Standard Nuclear oliGARCHy (SNoG) in [2]. We address the central question: *How many oliGARCHs from the 729-member ruling class are required to achieve complete reconnaissance coverage of all 83 megacities?*

2 The Standard Nuclear oliGARCHy: Overview

The SNoG comprises exactly $O = 729 = 3^6$ oliGARCHs distributed across 9 nuclear-capable districts, governing a total population of 48,524. The district structure is illustrated in Figure 1.

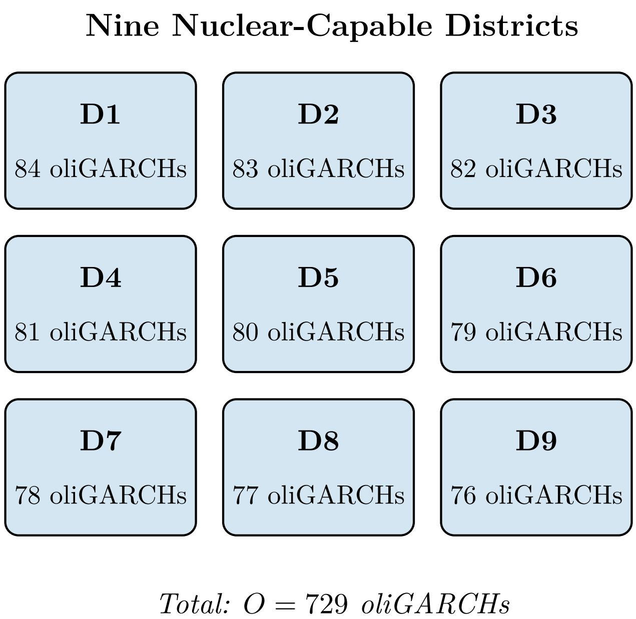

Figure 1: The nine nuclear-capable districts of the SNoG. Each district houses between 77 and 85 oliGARCHs, with the total fixed at $729 = 3^6$.

3 Megacity Reconnaissance: Protocol Specification

3.1 Parameters for Global Megacity Coverage

Let the parameters for complete megacity reconnaissance be defined as in Table 1.

Table 1: Protocol parameters for complete megacity scouting.

Parameter	**Symbol**	**Value**
Total oliGARCHs	O	729
Global megacities (pop. > 5M)	N	83
Cities per oliGARCH	m	3
Required scouting oliGARCHs	$k = \lceil N/m \rceil$	28
Remaining oliGARCHs	$O - k$	701
Fractional cost	k/O	$\approx 3.84\%$
Surplus city slots	$k \cdot m - N$	1

3.2 Formal Definition

Definition 1 (Megacity Scouting Assignment)**.** *A megacity scouting assignment is a function*

$$\sigma : \{1, 2, \dots, 28\} \longrightarrow \mathcal{P}(\mathcal{M}),$$

where $\mathcal{M}$ is the set of 83 megacities, such that:

(a) $|\sigma(i)| = 3$ for $i \in \{1, \dots, 27\}$ and $|\sigma(28)| = 2$, or

(b) $|\sigma(i)| = 3$ for all i with one auxiliary city added to complete the partition, and

(c) $\sigma(i) \cap \sigma(j) = \emptyset$ for all $i \neq j$.

The image of σ covers all 83 megacities with zero redundancy.

4 Combinatorial Analysis

4.1 Derivation of Required oliGARCHs

Proposition 1 (Minimal Scouting Force)**.** *For complete coverage of $N = 83$ megacities with $m = 3$ cities per oliGARCH under non-redundant assignment:*

$$k = \left\lceil \frac{N}{m} \right\rceil = \left\lceil \frac{83}{3} \right\rceil = \lceil 27.67 \rceil = 28.$$

Proof. Each oliGARCH visits exactly $m = 3$ distinct cities. For k oliGARCHs, the maximum coverage is $k \cdot m$ cities. Complete coverage requires $k \cdot m \geq N$, hence $k \geq N/m = 83/3 \approx 27.67$. Since $k \in \mathbb{Z}^+$, we have $k = 28$. □

4.2 Fractional Cost Analysis

The fractional cost of the megacity protocol is:

$$\frac{k}{O} = \frac{28}{729} \approx 0.0384 = 3.84\%.$$

This remains well below the 5% threshold considered operationally safe for maintaining governing capacity across all nine districts.

4.3 Assignment Matrix Structure

The scouting assignment matrix for the 83 megacities is illustrated in Figure 2.

	City 1	**City 2**	**City 3**
oliGARCH 1	c_1	c_2	c_3
oliGARCH 2	c_4	c_5	c_6
$\vdots$	$\vdots$	$\vdots$	$\vdots$
oliGARCH 28	c_{82}	c_{83}	—

28 oliGARCHs
$\times$ 3 cities each
$=$ 83 megacities
(1 slot unused)

Figure 2: Scouting assignment matrix for 83 megacities. The 28th oliGARCH covers only 2 cities to complete the assignment without redundancy.

5 General Coverage Formula

5.1 Deterministic Coverage

For an arbitrary coverage proportion $\theta \in (0, 1]$ of N cities:

Theorem 1 (General Scouting Requirement)**.** *The number of oliGARCHs required to achieve coverage θ of N megacities is:*

$$\boxed{k(\theta, N) = \left\lceil \frac{\theta \cdot N}{m} \right\rceil = \left\lceil \frac{\theta \cdot N}{3} \right\rceil}$$

Table 2 presents the required oliGARCHs for various coverage levels.

Table 2: Required oliGARCHs for various coverage levels of 83 megacities.

Coverage θ	**Cities Covered**	**oliGARCHs k**	**Fraction k/O**
25%	21	7	0.96%
50%	42	14	1.92%
75%	63	21	2.88%
90%	75	25	3.43%
100%	83	28	3.84%

5.2 Probabilistic Coverage with Confidence Levels

When cities are sampled probabilistically rather than assigned deterministically, achieving coverage proportion θ at confidence level $(1 - \alpha)$ with margin of error E requires:

Theorem 2 (Confidence-Adjusted Scouting Requirement)**.**

$$\boxed{k(\theta, \alpha, E) = \left\lceil \frac{Z_{1-\alpha/2}^2 \cdot \theta(1-\theta)}{E^2 \cdot m} \right\rceil}$$

where $Z_{1-\alpha/2}$ is the critical value of the standard normal distribution.

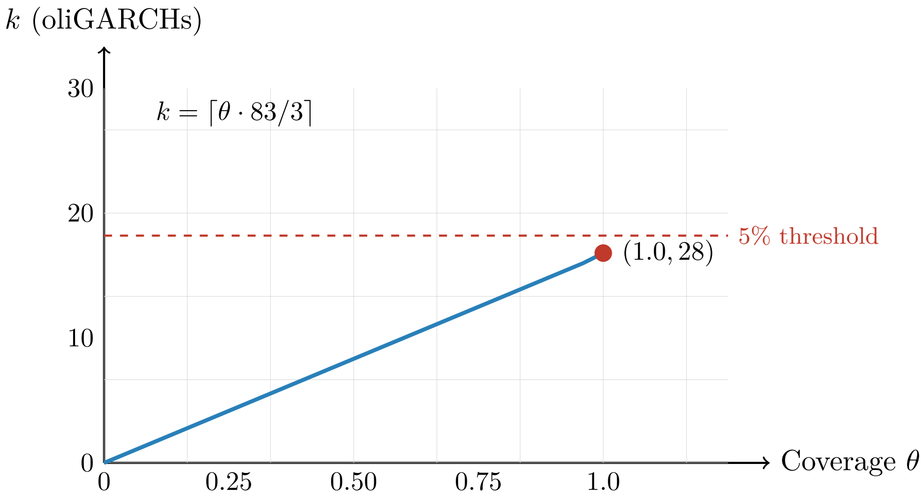

Figure 3: Required oliGARCHs k as a function of coverage proportion θ for $N = 83$ megacities. The dashed line indicates the 5% operational threshold ($k = 36$).

6 Information-Theoretic Analysis

6.1 Information Gain Model

Let each megacity $c \in \mathcal{M}$ possess a latent state vector $\mathbf{s}(c) \in \mathbb{R}^d$ encoding observable attributes (economic output, population dynamics, infrastructure, defensive posture). Prior uncertainty is modeled by entropy H_0; post-visit uncertainty is $H_1 < H_0$. The information gain per city is:

$$\Delta H = H_0 - H_1 > 0.$$

6.2 Total Information Gain

For complete coverage of all 83 megacities:

$$\Delta H_{\text{total}} = 83 \cdot \Delta H.$$

The reconnaissance efficiency is:

$$\eta = \frac{\Delta H_{\text{total}}}{k/O} = \frac{83 \cdot \Delta H}{28/729} = \frac{83 \times 729}{28} \cdot \Delta H \approx 2161 \cdot \Delta H.$$

7 Network Topology of Megacity Reconnaissance

The travel graph $G = (V, E)$ for the megacity protocol has:

- $|V| = 1 + 83 = 84$ vertices (SNoG hub plus 83 megacities)
- $|E| = 2 \times 83 = 166$ directed edges (outbound and return)

The structure forms a *star forest* of 28 sub-trees rooted at the SNoG, illustrated in Figure 4.

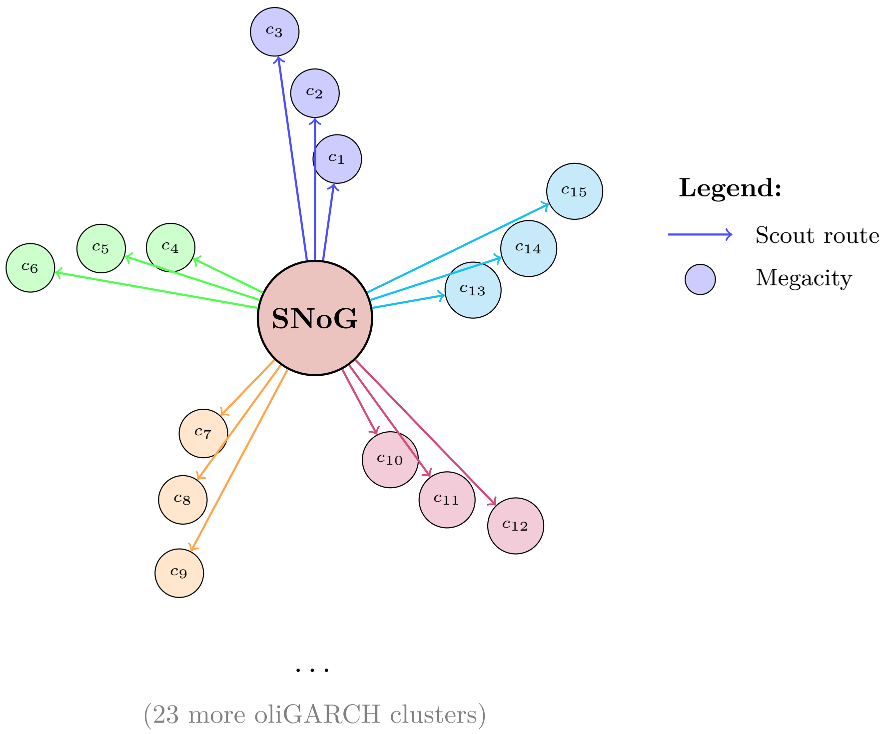

Figure 4: Travel graph G showing star-forest structure. Each of 28 oliGARCHs traces a star rooted at the SNoG with up to 3 megacity leaves.

8 Game-Theoretic Framing

The SNoG's strategic utility from the megacity protocol is:

$$u_{\text{SNoG}}(\sigma) = \alpha \cdot \Delta H_{\text{total}}(\sigma) - \beta \cdot \frac{k}{O} + \gamma \cdot |E^+|,$$

where:

- $\alpha > 0$: weight on intelligence value
- $\beta > 0$: weight on personnel cost
- $\gamma > 0$: weight on network-topology knowledge
- $|E^+|$: secondary transit edges learned

For the optimal non-redundant megacity protocol:

$$u_{\text{SNoG}}(\sigma^*) = 83\alpha \cdot \Delta H - \frac{28\beta}{729} + \gamma|E^+|.$$

Proposition 2 (Optimality)**.** *The non-redundant assignment σ^* uniquely maximizes u_{SNoG} over all 28-oliGARCH assignments to 83 megacities when $\alpha > 0$.*

9 Summary: What the SNoG Learns

Upon completion of the megacity reconnaissance protocol, the SNoG possesses:

1. **First-person intelligence** on all 83 global megacities—Jakarta, Dhaka, Tokyo, and 80 others

2. **Comparative urban data** enabling cross-city ranking on economic, demographic, and strategic metrics
3. **Route intelligence**: transit times, connectivity, and logistics between cities within each scout's cluster
4. **Global strategic map**: relative positioning of major population centers
5. **Full personnel recovery**: all 729 oliGARCHs restored upon protocol completion

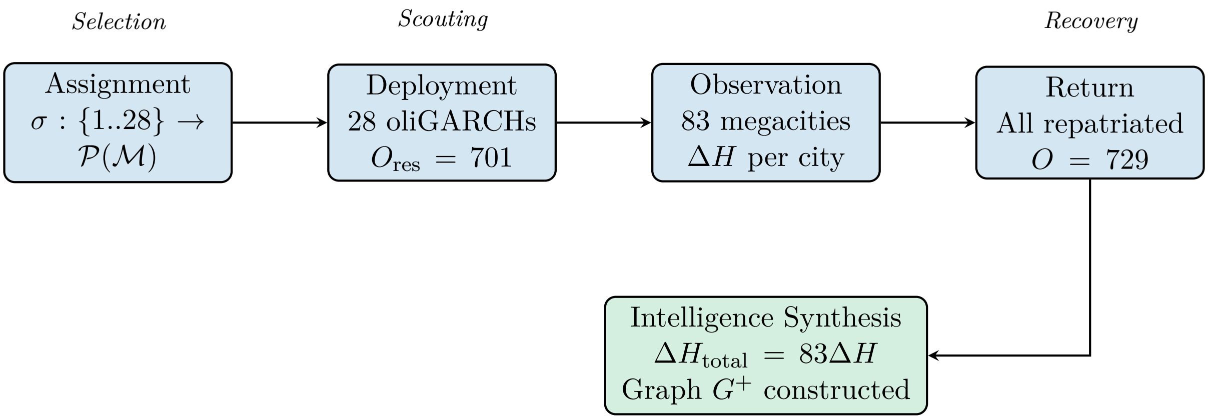

Figure 5: Information-flow architecture of the megacity scouting protocol.

10 Conclusions

This analysis demonstrates that the Standard Nuclear oliGARCHy can achieve complete reconnaissance coverage of all 83 UN-identified megacities by deploying only 28 oliGARCHs—3.84% of its ruling class. The protocol preserves governing capacity, guarantees full personnel recovery, and maximizes information gain through non-redundant city assignment.

The general formulae derived herein—$k = \lceil \theta N/m \rceil$ for deterministic coverage and the confidence-adjusted variant—provide a scalable framework for planning reconnaissance operations at arbitrary coverage and confidence levels.

References

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Glossary

SNoG *Standard Nuclear oliGARCHy.* The governing system comprising 9 nuclear-capable districts and exactly $729 = 3^6$ oliGARCHs.

oliGARCH A member of the 729-strong ruling class of the SNoG, whose identity is determined by the sign-state of six coefficients in the oliGARCH differential equation.

Megacity An urban agglomeration with population exceeding 5 million inhabitants. The UN World Urbanization Prospects 2025 identifies 83 such cities globally.

District One of the nine nuclear-capable administrative units of the SNoG, each housing between 77 and 85 oliGARCHs.

Scouting Assignment A function σ mapping each deployed oliGARCH to a set of mutually exclusive cities for reconnaissance.

Return Ticket A guaranteed repatriation instrument ensuring deployed oliGARCHs return to the SNoG after completing their city visits.

Travel Graph The directed graph $G = (V, E)$ whose vertices are the SNoG and visited cities, with edges representing scout routes.

Connectivity Graph The augmented graph $G^+ = (V, E \cup E^+)$ including secondary transit edges learned during travel.

Information Gain The reduction in uncertainty $\Delta H = H_0 - H_1$ achieved by first-person reconnaissance of a previously unobserved city.

Reconnaissance Efficiency The ratio $\eta = \Delta H_{\text{total}}/(k/O)$, measuring information gained per unit of oliGARCH-fraction deployed.

Non-Redundant Coverage A protocol in which no city is visited by more than one oliGARCH, maximizing total information gain.

Star Forest The graph-theoretic structure formed by disjoint star sub-graphs, each rooted at the SNoG with city-leaves.

Fractional Cost The proportion k/O of the oliGARCH population deployed for a given protocol.

Coverage Proportion The fraction $\theta \in (0, 1]$ of target cities included in a scouting protocol.

Confidence Level The probability $(1 - \alpha)$ that a probabilistic coverage estimate falls within a specified margin of error.

The End