- Company Introduction
- Products
- Financials
- Market Trend
- Company Introduction
- Products
- Financials
- Market Trend
Top Player with Extremely High Entry Barrier


- First mover and major player in Geo-location niche market. 40 patents awarded. 30% market share.

- O-RAN Alliance Contributor since 2019.

- Awarded as Best Network Operations - Network Management Solution at Telco AI Summit. Featured as a top product utilizing AI & data analytics in telecom field by Analysys Mason.
Global customers across Asia, EMEA, and America.

Analyzing 1 Billion+ subscribers big data.
Groundhog Executives

David Chiou, CEO
- MS, MIT Media Lab.
- Merrill Lynch Fellow.
- AT&T Labs-Research RA. Founding advisor of Skysoft.

Philip Young, CTO
- MS CS, Rutgers Univ. Data Mining Lab. BS EIS, Cambridge University.
- Technical lead, PacketStream.
- Researcher at Bell Labs.

Beong Lin, VP Sales for Strategic Accounts
- AT&T and other EMEA accounts.
- Past experience in BenQ Europe, TwinMOS, etc.

Kuan Chang, VP of Business Development
- MSc in Strategic Product Design TU Delft, BS NTU ME.
- Founding member of eSOON (acquired by China Intelligent Transport Systems).
- Co-founder of Skysoft (KKbox), which was acquired by KDDI.

Shaun Chang, VP, Mobility Intelligence
- MBA, NTU IM Network Optimization Lab.
- External consultant of Interwoven(acquired by HP) CMS product line.
How We Started

Subscriber data from operators

Home  Event  Travelling  Work

Chaos Theory
Proprietary Mobility Model

MIT-Originated

Online Behavior

Accurate Consumer Insight

Real-life Behavior

Confidential
Mobility and user behavior decides signaling, traffic dynamics, and bottlenecks in network and big data processing.

**Location**
- 24x7
- Latitude, longitude
- Up to 50x50m accuracy thanks to key IP.

**QoE**
- Drop Rate
- Throughput
- Volume
- RF conditions
- etc.

**Context**
- Moving
- Speed
- Direction
- Indoor / Outdoor
- POI
- etc.

**Life Style**
- User Mobility Pattern Profile
- Sticky Locations
- Commute Distance
- Deterministic Location Prediction
- etc.

Mobility Intelligence is a key to monetize mobile big data.
- Company Introduction
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Groundhog Products

- CovMo™: for accurate network planning and optimization
- Mobility Intelligence™: for advertising & market strategy
- RealMotion™: for public safety
Groundhog Products - CovMo™

• **Enhancing subscriber experience**: pinpoints subscribers’ locations 24x7 for improving network quality, enhancing subscriber experience, and reducing churn, with automatic root cause analysis and optimization features.

• **Significantly increasing cost efficiency for operators**: efficiently increases ROI and saves drive test cost of USD millions every year for operators, with #1 geolocation accuracy.

• **Efficient 5G deployment**: helps surgical deployment planning of 5G and new applications.

**Nation-wide, 24x7, frequent geolocation & measurement of all subscribers.**
Revealing Live KPI Geographically
Only Chaos Theory Enabled Geolocation with Proven Indoor Capability
Groundhog Core Technologies

- CovMo leverage human moving pattern and develop sophisticated modeling techniques to understand and predict user mobility pattern with Chaos Theory and Deep Learning.
Groundhog Advantages

**BEST GEOLOC ACCURACY – VALIDATED BY OPERATORS & VENDORS**

Based on 40+ patents

**ONLY CHAOS THEORY ENABLED GEOLOC WITH PROVEN INDOOR CAPABILITY**

Geolocate down to Indoor Resolution

**CLOUD COMPUTING ARCHITECTURE**

- Easy nationwide deployment
- 24x7 near realtime access
- Robust and reliable service

**1st NATIONWIDE 2G+3G+4G+5G GEOLOC DEPLOYMENT**

Proven MV, All-RAT Capability
CovMo – High Growth Potential for 5G

- Telecom industry is highly specialized with high entry barrier.
- MNOs tend to select incumbent software supplier for cell expansion and 5G sites.
- CovMo is capacity-based license modeling.

<table>
<thead>
<tr>
<th>Name of Operator</th>
<th>2G</th>
<th>3G</th>
<th>4G</th>
<th>5G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Telecom Company</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Fareastone Telecom</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Emirates Telecommunications</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Singapore Telecommunications Limited</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Singtel Optus Pty Limited</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Ooredoo Group</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Telkomsel</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Viettel Group</td>
<td>V</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unifi Mobile</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>SALT Mobile and Monaco Telecom</td>
<td>V</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Rakuten Mobile</td>
<td></td>
<td>V</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Bharti Airtel Limited</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>
• **DEP**: Transform mobile subscribers’ mobility and online & offline behavior into subscriber insight, with 500+ audience labels and hundreds of customized labels for each subscriber.

• **DSP**: Enable turn-key programmatic mobile advertising services for marketers and advertisers, while eliminating risk of data exposure.

*Data monetization for mobile operators.*
Find Target Audience with Telco Data

Online Behavior

On-site behavior

Browsing behavior

Offline Behavior

Localization

Segmentation

Included Segment #1
- Age: 18-24
- Gender: Male

Included Segment #2
- Travel_Local > Travel_Local
Groundhog Products – RealMotion™

- **Urban planning**: Word Cup, Formula 1, World Expo, city planning.
- **Footprint analysis**: for contact tracing and various applications.
- **Travelers monitoring**: Monitor travelers’ mandatory or self-regulating quarantines.

*Groundhog’s platform as part of national infrastructure.*
- Company Introduction
- Products
- Financials
- Market Trend
**Groundhog Financials – 2020 & 2021**

- **No huge increase in CapEx with sales order growth**

<table>
<thead>
<tr>
<th>USD thousand</th>
<th>2020</th>
<th>%</th>
<th>2021</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>8,282</td>
<td>100%</td>
<td>10,127</td>
<td>100%</td>
</tr>
<tr>
<td>COGS</td>
<td>1,668</td>
<td>20%</td>
<td>1,959</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Gross profit</strong></td>
<td><strong>6,613</strong></td>
<td><strong>80%</strong></td>
<td><strong>8,168</strong></td>
<td><strong>81%</strong></td>
</tr>
<tr>
<td>Operating expense</td>
<td>4,075</td>
<td>49%</td>
<td>5,319</td>
<td>53%</td>
</tr>
<tr>
<td>Operating income</td>
<td>2,538</td>
<td>31%</td>
<td>2,849</td>
<td>28%</td>
</tr>
<tr>
<td>Pre-tax income</td>
<td>1,690</td>
<td>20%</td>
<td>2,289</td>
<td>23%</td>
</tr>
<tr>
<td>Income tax</td>
<td>628</td>
<td>8%</td>
<td>769</td>
<td>8%</td>
</tr>
<tr>
<td>Net income</td>
<td>1,061</td>
<td>13%</td>
<td>1,520</td>
<td>15%</td>
</tr>
<tr>
<td>EPS</td>
<td>0.05</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
</tbody>
</table>

**Gross profit 80%, manufacturing cost $0, service cost 10-20%**

2020 fx rate: 29.55
2021 fx rate: 28.01
Stable Expansion & Warranty Contribution

2020
8 mil USD

- CovMo-first installation: 8%
- MI: 1%
- CovMo-expansion: 66%
- CovMo-Warranty: 25%

2021
10 mil USD

- CovMo-first installation: 7%
- MI: 2%
- Realmotion: 2%
- CovMo-expansion: 65%
- CovMo-Warranty: 24%
CovMo 5G Contribution will Continue to Rise

- **2020**
  - 8 mil USD
  - 3G-4G 99%
  - 5G 1%

- **2021**
  - 10 mil USD
  - 3G-4G 87%
  - 5G 13%
<table>
<thead>
<tr>
<th>USD thousand</th>
<th>2022 H1</th>
<th>%</th>
<th>2021 H1</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>6,076</td>
<td>100%</td>
<td>2,879</td>
<td>100%</td>
</tr>
<tr>
<td>COGS</td>
<td>934</td>
<td>15%</td>
<td>881</td>
<td>31%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>5,142</td>
<td>85%</td>
<td>1,998</td>
<td>69%</td>
</tr>
<tr>
<td>Operating expense</td>
<td>2,864</td>
<td>47%</td>
<td>2,418</td>
<td>84%</td>
</tr>
<tr>
<td>Operating income</td>
<td>2,278</td>
<td>38%</td>
<td>(420)</td>
<td>(15%)</td>
</tr>
<tr>
<td>Pre-tax income</td>
<td>3,407</td>
<td>56%</td>
<td>(862)</td>
<td>(30%)</td>
</tr>
<tr>
<td>Income tax</td>
<td>502</td>
<td>8%</td>
<td>177</td>
<td>6%</td>
</tr>
<tr>
<td>Net income</td>
<td>2,905</td>
<td>48%</td>
<td>(1,039)</td>
<td>(36%)</td>
</tr>
<tr>
<td>EPS</td>
<td>0.10</td>
<td></td>
<td>(0.04)</td>
<td></td>
</tr>
</tbody>
</table>

2021 H1 fx rate: 28.17
2022 H1 fx rate: 28.16
Groundhog Financials – 2022 H1 Breakdown

Revenue by product

- CovMo-first installation: 22%
- CovMo-expansion: 48%
- CovMo-Warranty: 27%
- MI: 1%
- Realmotion: 2%

6 mil USD

CovMo Revenue by generation

- 5G: 29%
- 3G-4G: 71%

6 mil USD
CovMo – Robust ARPU Growth

CovMo ARPU*

USD thousand

2020: 374
2021: 486

+30%

*Average revenue per unit (ARPU) = CovMo revenue / number of CovMo customers

2020 fx rate: 29.55
2021 fx rate: 28.01
CovMo – Strong 5G ARPU Growth

**3G&4G ARPU***

USD thousand

- **2020**: 372
- **2021**: 402

+8% growth

**5G ARPU***

USD thousand

- **2020**: 14
- **2021**: 257

+1736% growth

*Average revenue per unit (ARPU) = CovMo revenue / number of CovMo customers

2020 fx rate: 29.55
2021 fx rate: 28.01
- Annual 5G market demand for Groundhog existing customers: $22 \times 5m / 5 = 22$ million USD
- Annual 5G market demand for total addressable market: $500 \times 5m / 5 = 500$ million USD

*MNOs: Mobile network operators
Source: Global Mobile Suppliers Association, Groundhog
Mobility Intelligence Market Potential

Digital Ad spending by 2022:

- **Indonesia**: 2021: $4 billion, 2022: $4.4 billion
- **Vietnam**: 2021: $1.3 billion, 2022: $1.4 billion
- **Thailand**: 2021: $0.6 billion, 2022: $0.7 billion
- **Bangladesh**: 2021: $0.27 billion, 2022: $0.3 billion

Total Addressable Market in 2022: **6.8 Billion USD**

Source: Research and Markets, Digital Advertising Association of Thailand, Statista
Repeating Business Accounts for 90% of Revenue

Revenue from repeating business

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>92%</td>
</tr>
<tr>
<td>2018</td>
<td>96%</td>
</tr>
<tr>
<td>2019</td>
<td>98%</td>
</tr>
<tr>
<td>2020</td>
<td>91%</td>
</tr>
<tr>
<td>2021</td>
<td>89%</td>
</tr>
</tbody>
</table>

Revenue from non-repeating business

* Repeating business includes CovMo cell expansion and warranty
### Revenue by Region

**2020**
- Saudi Arabia: 20%
- Indonesia: 19%
- Japan: 16%
- UK: 8%
- India: 7%
- Taiwan: 6%
- Others: 24%

**Revenue:** 8 mil USD

**2021**
- Indonesia: 29%
- Japan: 6%
- Saudi Arabia: 11%
- Qatar: 5%
- Others: 20%
- India: 14%
- Taiwan: 15%

**Revenue:** 10 mil USD

**2020 fx rate:** 29.55
**2021 fx rate:** 28.01
Confidential

Groundhog Financials - Revenue

Robust Revenue Growth

USD thousand

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>Percent Change</th>
<th>USD thousand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>8,282</td>
<td></td>
<td>8,282</td>
</tr>
<tr>
<td>2021</td>
<td>10,127</td>
<td>+30%</td>
<td>10,127</td>
</tr>
<tr>
<td>TTM (2021.07-2022.06)</td>
<td>13,212</td>
<td></td>
<td>13,212</td>
</tr>
<tr>
<td>2021 H1</td>
<td>2,879</td>
<td>+111%</td>
<td>2,879</td>
</tr>
<tr>
<td>2022 H1</td>
<td>6,076</td>
<td></td>
<td>6,076</td>
</tr>
</tbody>
</table>

2020 fx rate: 29.55
2021 fx rate: 28.01
TTM fx rate: 28.28

2021 H1 fx rate: 28.17
2022 H1 fx rate: 28.16
Groundhog Financials – EBITDA

Strong EBITDA Growth driven by Incremental Revenue

Incremental cost is small for module-based software product

USD thousand

2020: 2,262
2021: 2,775
TTM (2021.07-2022.06): 7,063
2021 H1: (690)
2022 H1: 3,648

2020 fx rate: 29.55
2021 fx rate: 28.01
TTM fx rate: 28.28
2021 H1 fx rate: 28.17
2022 H1 fx rate: 28.16

+23%
+155%
+629%

USD thousand

2020: 2,262
2021: 2,775
TTM (2021.07-2022.06): 7,063
2021 H1: (690)
2022 H1: 3,648

2020 fx rate: 29.55
2021 fx rate: 28.01
TTM fx rate: 28.28
2021 H1 fx rate: 28.17
2022 H1 fx rate: 28.16

+23%
+155%
+629%
- Company Introduction
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Market Trend

- Data traffic doubles every 18 months
- SE Asia and Middle East markets are fast growing
- O-RAN and other demands drive pure software play
- Operators start to be open to data monetization
Leading technology in highly specialized field

International customer base with increasing market share

Foreseeable revenue growth from 5G, O-RAN, and data traffic

High TAM for Mobility Intelligence with unique advantage
Thank you.