Here’s a **detailed comparison** between **Azure Event Grid**, **Event Hubs**, **Service Bus**, and **Storage Queues** across core characteristics such as purpose, delivery model, ordering, message size, latency, throughput, and common use cases.

### **🔹 1. Azure Event Grid**

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| --- | --- |
| **Category** | **Description** |
| **Purpose** | Event routing platform for reactive programming, serverless applications, and decoupled architectures. |
| **Message Type** | Discrete events (e.g., file created, resource deleted). |
| **Message Size Limit** | 1 MB |
| **Ordering** | Not guaranteed (but can use event timestamp). |
| **Delivery Model** | Push-based (HTTP POST); at-least-once delivery. |
| **Latency** | < 100 ms (low) |
| **Throughput** | Millions of events/sec per region |
| **Retry Mechanism** | Yes (exponential backoff) |
| **Dead-lettering** | Yes |
| **Common Use Cases** | - Serverless automation - Event-driven apps - Integration across services (e.g., Blob Storage triggers Azure Function) |
| **Supports Fan-out?** | Yes (built-in with multiple subscribers) |
| **Protocol** | HTTP/HTTPS only |
| **Geo-disaster Recovery** | No (must be implemented externally) |

### **🔹 2. Azure Event Hubs**

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| **Category** | **Description** |
| **Purpose** | High-throughput data ingestion (streaming) for telemetry and analytics. |
| **Message Type** | Streaming data (telemetry, logs, time-series). |
| **Message Size Limit** | 1 MB per message |
| **Ordering** | Per-partition ordering guaranteed |
| **Delivery Model** | Pull-based (consumers read from partitions); at-least-once |
| **Latency** | ~100 ms (low to medium) |
| **Throughput** | Very high (millions of events/sec) |
| **Retry Mechanism** | Handled by consumer logic |
| **Dead-lettering** | No built-in DLQ; must be implemented |
| **Common Use Cases** | - IoT telemetry - Log ingestion - Real-time analytics pipelines (e.g., Azure Stream Analytics, Databricks) |
| **Supports Fan-out?** | Yes (via consumer groups) |
| **Protocol** | AMQP, HTTPS, Kafka |
| **Geo-disaster Recovery** | Yes (Geo DR and availability zones supported) |

### **🔹 3. Azure Service Bus**

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| --- | --- |
| **Category** | **Description** |
| **Purpose** | Enterprise message broker with advanced features (FIFO, dead-lettering, transactions). |
| **Message Type** | Durable enterprise messages (e.g., business processes, workflows). |
| **Message Size Limit** | 256 KB (Standard), 1 MB (Premium) |
| **Ordering** | FIFO with Sessions |
| **Delivery Model** | Pull-based (queue/topic); at-least-once |
| **Latency** | Medium |
| **Throughput** | Moderate to high (depends on tier) |
| **Retry Mechanism** | Yes (built-in with retries and DLQs) |
| **Dead-lettering** | Yes (built-in DLQ per queue/subscription) |
| **Common Use Cases** | - Order processing - Inventory and billing workflows - Application decoupling |
| **Supports Fan-out?** | Yes (with Topics & Subscriptions) |
| **Protocol** | AMQP, HTTPS |
| **Geo-disaster Recovery** | Yes (Premium tier only) |

### **🔹 4. Azure Storage Queue**

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| --- | --- |
| **Category** | **Description** |
| **Purpose** | Simple, persistent messaging between components. |
| **Message Type** | Simple messages (text, small binary blobs). |
| **Message Size Limit** | 64 KB (base), up to 256 KB with large message support |
| **Ordering** | Not guaranteed |
| **Delivery Model** | Pull-based; at-least-once |
| **Latency** | High (seconds-level) |
| **Throughput** | Moderate |
| **Retry Mechanism** | Must be implemented manually (visibility timeout + retries) |
| **Dead-lettering** | No (must be implemented externally) |
| **Common Use Cases** | - Decoupling components - Background job processing - Simpler use cases with Azure Functions |
| **Supports Fan-out?** | No native support |
| **Protocol** | HTTP/HTTPS |
| **Geo-disaster Recovery** | Yes (via GRS replication in Storage Account) |

### **✅ Summary Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | **Event Grid** | **Event Hubs** | **Service Bus** | **Storage Queue** |
| **Use Case** | Event-driven | Telemetry streaming | Business messaging | Basic messaging |
| **Message Size** | 1 MB | 1 MB | 256 KB / 1 MB | 64 KB / 256 KB |
| **Ordering** | ❌ | ✅ (per partition) | ✅ (with sessions) | ❌ |
| **Protocol** | HTTP | AMQP/HTTP/Kafka | AMQP/HTTP | HTTP |
| **Fan-out** | ✅ | ✅ (consumer groups) | ✅ (topics/subs) | ❌ |
| **Latency** | <100 ms | ~100 ms | Medium | High |
| **DLQ** | ✅ | ❌ | ✅ | ❌ |
| **Geo DR** | ❌ | ✅ | ✅ (Premium) | ✅ |
| **Push/Pull** | Push | Pull | Pull | Pull |
| **Durability** | High | High | Very High | High |
| **Ordering Support** | No | Partition | Session | No |

Would you like a **visual diagram** comparing their data flow or a **decision tree** for selecting between them?

##### **You said:**

yes

###### **ChatGPT said:**

Image created

