

无人机监管与飞行服务系统技术探讨

Technical Discussion on UAV Management and Flight Service System

中电科特种飞机系统工程有限公司

CETC Special Mission Aircraft System Engineering Co., Ltd.

目 录

Contents



- 一、背景介绍 I. Background
- 二、系统方案 II. System Scheme
- 三、应用情况 III. Application
- 四、发展展望 IV. Development Prospect
- 五、关于我们 V. About Us

目 录

Contents

- 一、背景介绍 I. Background
- 二、系统方案 II. System Scheme
- 三、应用情况 III. Application
- 四、发展展望 IV. Development Prospect
- 五、关于我们 V. About Us



1. 无人机发展 1. Development of UAV

近年来，我国民用无人消费型无人机呈现爆发性增长趋势，大量低空无人机的出现对公共安全、民航安全和国防安全造成严重影响。加强民用无人机的管理与服务已经成为整个社会的迫切需求。

In recent years, the civil consumer UAV market in China has been growing explosively. With the emergence of a lot of low-altitude UAVs, the public security, civil aviation security and national defense security will be impacted seriously. To enhance the management and service of civil UAVs has become an urgent social requirement.



2. 无人机监管情况-国内 2. UAV supervision -China

- **无人机管理法律法规** : Laws and regulations on UAV management:

序 No	时间 Time	名称 Description
1	2015.12	轻小 无人机 运行规定 Interim Provisions on the Operation of Light and Small UAVs
2	2016.9	民用 无人 驾驶航空器系统空中交通管理办法 Measures for ATC of Civil UAV
3	2017.9	四川省民用无人驾驶航空器安全管理暂行规定 Interim Provisions on Security Management of Civil UAVs in Sichuan Province
4	2018.1	无人驾驶航空器飞行管理暂行条例(征求意见稿) Interim Provisions on UAV Flight Management(draft for comment))
5	2018.8	民用 无人机 驾驶员管理规定 Provisions on Management of the Operators of Civil UAVs

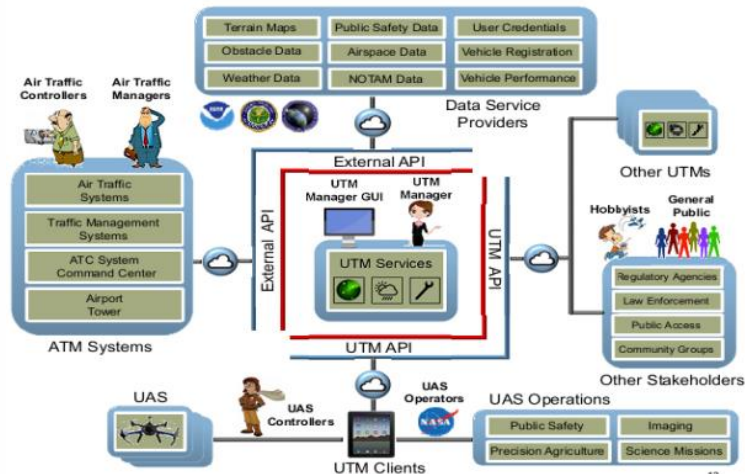
分类 Classification	空机重量 (千克) Empty Weight (kg)	起飞全重 (千克) Takeoff Gross Weight (kg)
I	0<W≤1.5	
II	1.5<W≤4	1.5<W≤7
III	4<W≤15	7<W≤25
IV	15<W≤116	25<W≤150
V	植保类无人机 Agriculture spraying drones	
VI	无人飞艇 Unmanned airship	
VII	可100米之外超视距运行的I、II类无人机 Classes I and II UAVs that can operate at ranges greater than 100m	

- **无人机协同监管**: 主要通过GPS/BD+2G/4G实现, 现有无人机云管理系统8个 (截至2018.8) 。 Collaborative supervision and management of **UAVs**: mainly enabled by GPS/BD+2G/4G. By August 2018, 8 UAV cloud management systems have been approved.
- **无人机探测反制** : 主要有低空雷达、光电探测、无线电监测及反制。 **UAV detection and countermeasure**: mainly including low altitude radar, photoelectric detection, radio monitoring and countermeasure.

2. 无人机监管情况-国外 2. UAV supervision-abroad

● 无人机管理法律法规 : Laws and regulations on UAV

序 No.	时间 Time	国别 Country	名称 Description
1	2015.12	美国 U.S.	《轻型无人航空器系统的运行和审定》 Operation and Approval of Light UAVs
2	2016.7	欧洲航空安全局 EASA	《无人机运营规则》 Rules on Operation of UAVs
3	2016.9	英国、澳大利亚 UK and Australia	



- **无人机协同监管** : 主要依靠NASA推动, 要求纳入国家空域运行系统, 主要依托空域信息平台+移动通信网络+移动互联网实现。主要参与方有NASA、Exelis、Airware、Skyward等 ; Collaborative supervision and management of UAVs:

It's promoted mainly by NASA, required to be included into the national airspace operation system, and realized mainly relying on the airspace information platform, the mobile communication network and the mobile internet. Main participants include NASA, Exelis, Airware, and Skyward.

- **无人机探测反制** : 德国Dedrone的DroneTracker、美国Battelle公司的DroneDefender、英国Blighter的AUDS等。

UAV detection and countermeasure: Typical companies include DroneTracker under Dedrone (Germany), DroneDefender under Battelle (America) and AUDS under Blighter (UK).

目 录

Contents



一、背景介绍 I. Background

二、系统方案 II. System Scheme

三、应用情况 III. Application

四、发展展望 IV. Development Prospect

五、关于我们 V. About Us

1. 系统目标

1. System Goal

针对民用无人机运行需求，构建综合化无人机监管平台，实现无人机行政管理、空域管理、飞行管理、飞行服务及治安协同功能，适应多种应用场景和用户角色。

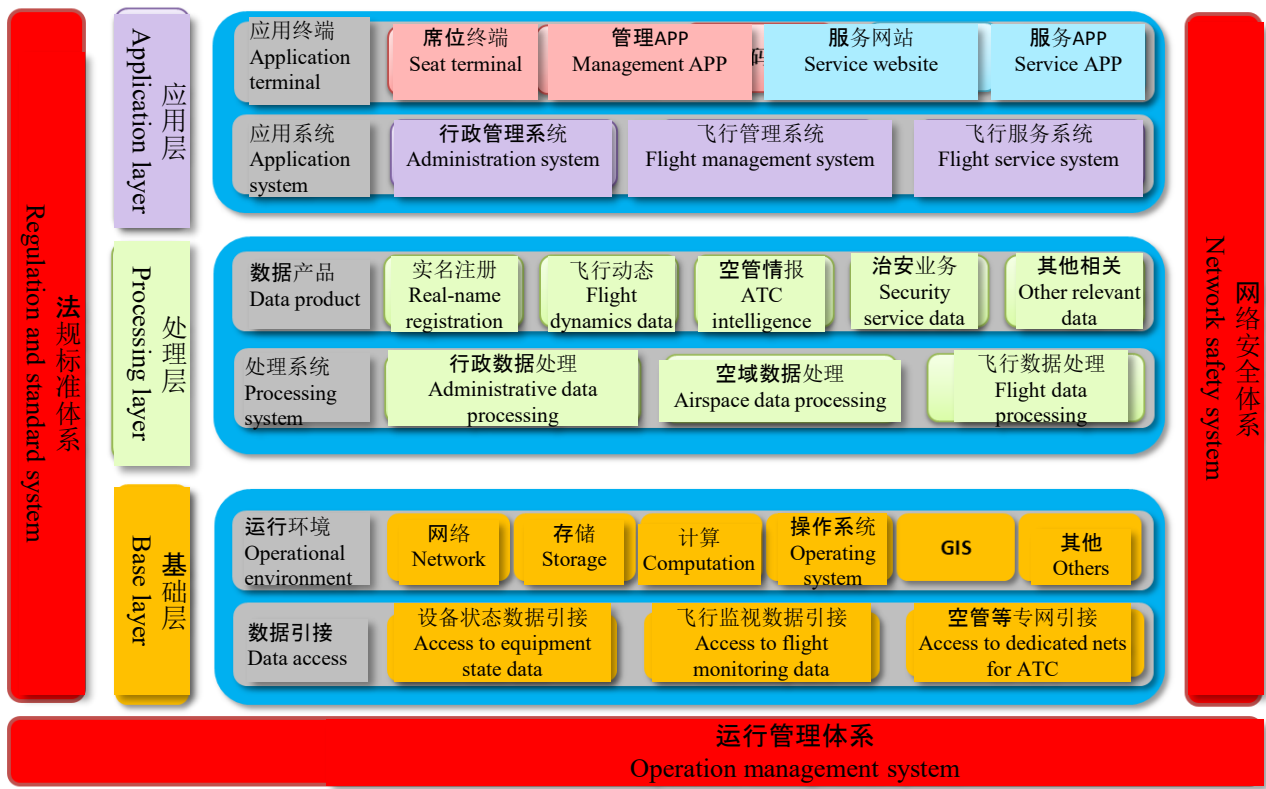
Aiming at the operational requirements of UAV, an integrated UAV monitoring platform is constructed to realize the functions of UAV administration, airspace management, flight management, flight service and security administration, and to adapt to various application scenarios and user roles.

2. 系统架构 2. System architecture



3. 体系设计

3. System design



4. 系统功能 4. System functions



4. 系统功能

4. System functions

无人机企业信息管理

UAV enterprise information management

无人机信息管理

UAV information management

驾驶员信息管理

Operator information management

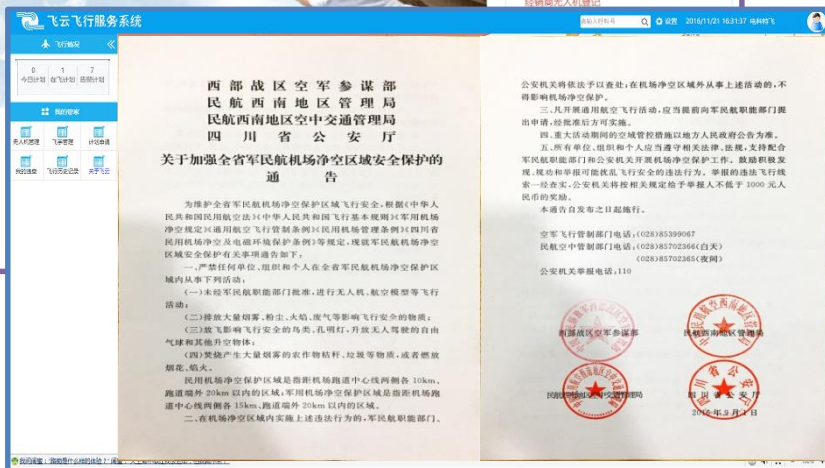
流通环节信息管理

Circulation information management

重要通告发布

Issuing important announcement

行政管理
Administrative management



4. 系统功能 4. System functions

飞行空域划设
Delineating flight airspace

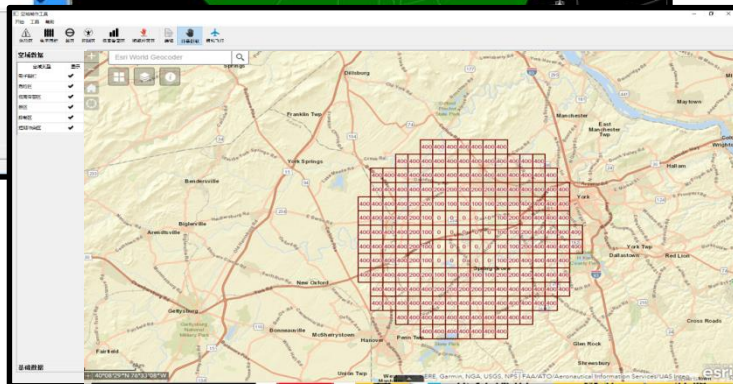
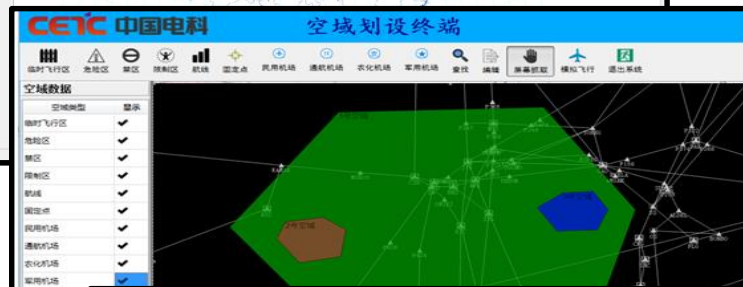
电子围栏划设
Delineating electronic enclosure

航路航线划设
Setting air route

空域数据发布
Publishing airspace data

空域效能评估
Assessing airspace efficiency

空域管理
Airspace
management



4. 系统功能

4. System functions

飞行管理
Flight management

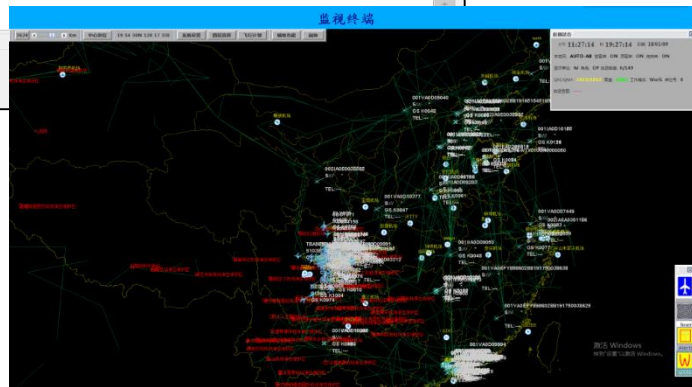
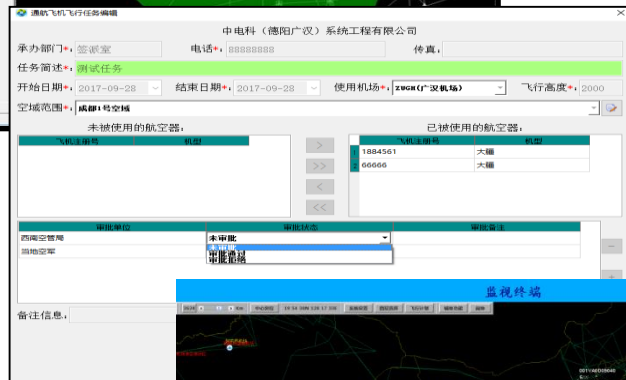
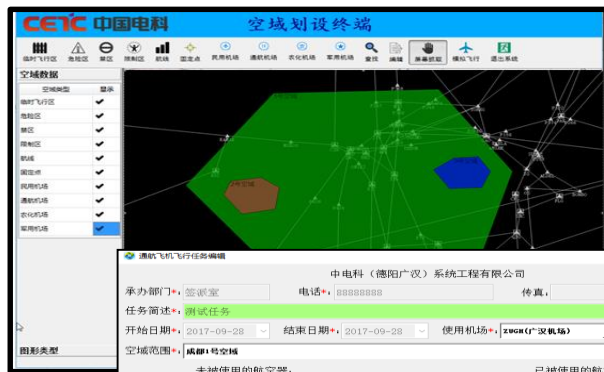
飞行空域审批报备
Filing flight airspace for approval

飞行任务审批报备
Filing flight task for approval

飞行计划审批报备
Filing flight plan for approval

飞行航迹监视
Monitoring flight path

重要通告发布
Issuing important announcement



4. 系统功能

4. System functions

治安协同 Security administration

电子围栏管理
Managing electronic enclosure

飞行预告警
Flight warning

违规行为举报
Reporting illegal behavior

探测反制协同
Coordinating detection and countermeasure

违规行为公示
Announcing offending behavior



4. 系统功能

4. System functions

空域申请服务
Airspace application service

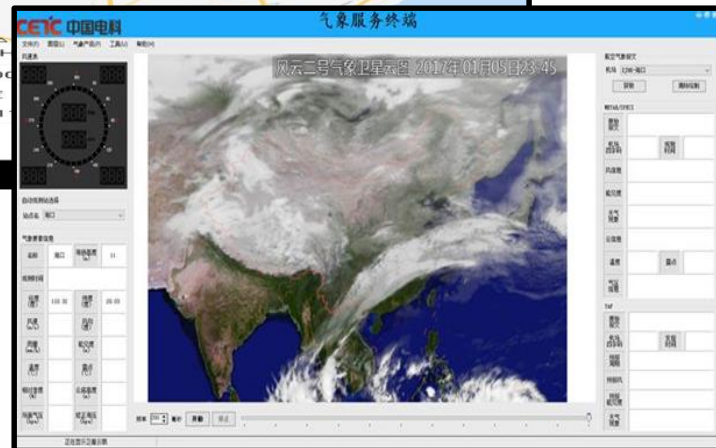
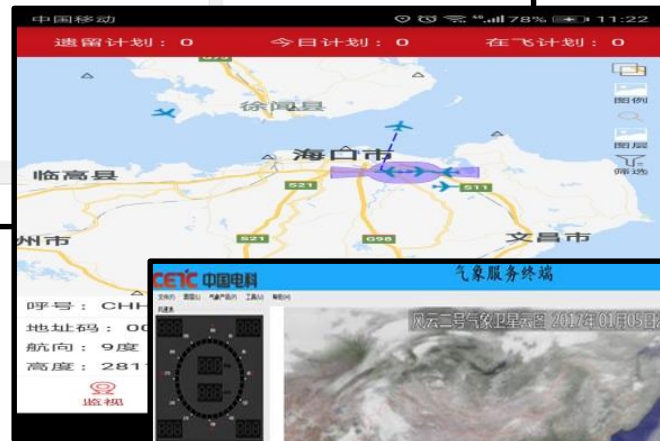
计划申请服务
Plan application service

情报气象服务
Intelligence and weather service

航迹记录回复
Flight path record response

其它信息服务
Other information services

飞行服务
Flight service



4. 系统功能 4. System functions

大数据增值应用
Big data value-added application

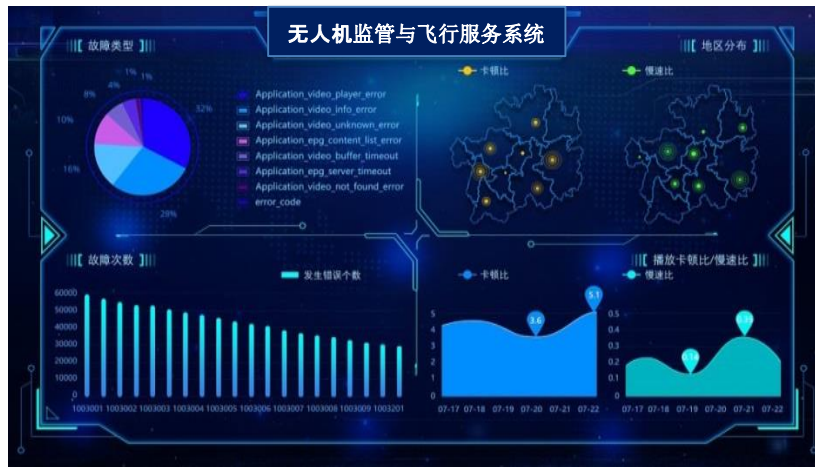
行业信息统计
Industrial statistics

空域运行趋势
Airspace operation trend

飞行趋势分析
Flight trend analysis

飞行习惯统计
Flight habit statistics

其它增值应用
Other value-added applications



5.系统特点
5. System features

功能体系完整

Complete functional system

多方一体协同

Multi-party coordination

网络安全可靠

Safe, reliable network

运行模式灵活

Flexible operation mode



目 录

Contents



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2017年：新疆兵团飞行服务体系
2017: Flight service system of Xinjiang Production and Construction Corps



2016年：西南无人机飞行服务中心
2016: Southwest UAV Flight Service Center



2018年：川南通用航空飞行服务中心
2018: South Sichuan General Aviation Flight Service Center



2015年：陕西凤翔低空空管示范
2015: Low-altitude ATC demonstration in Fengxiang County, Shaanxi Province



2018年：上海无人机飞行服务中心
2018: Shanghai UAV Flight Service Center



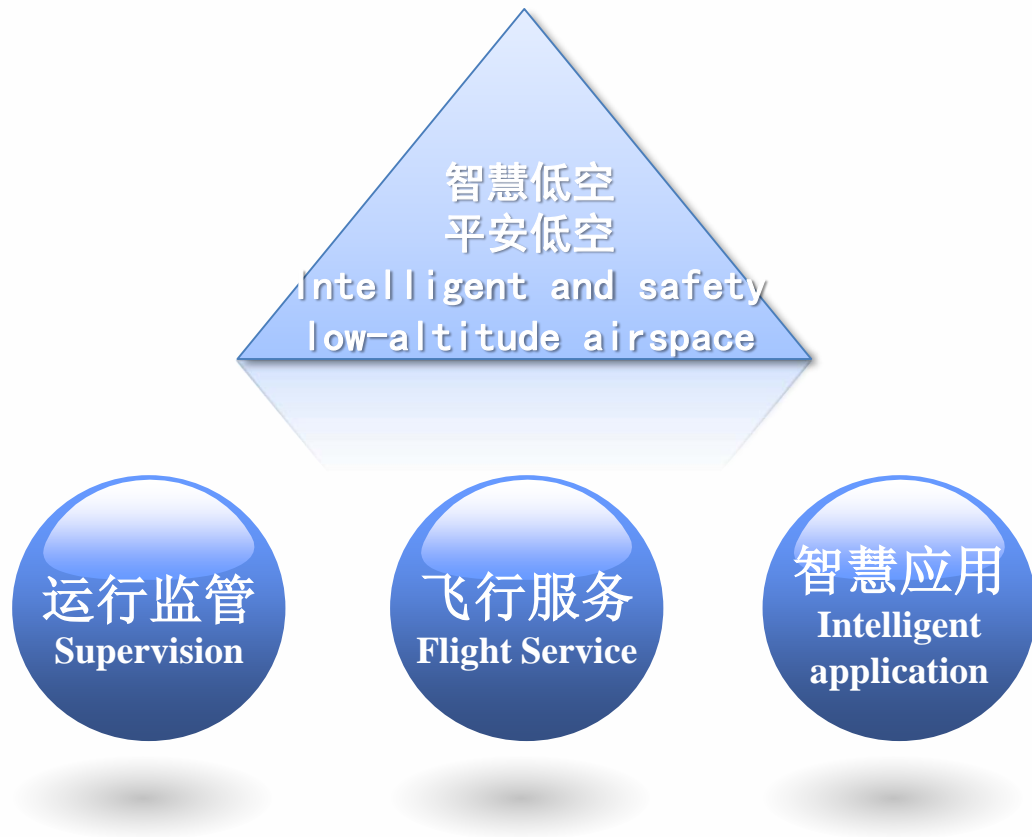
2017年：海航通航飞行监视服务系统
2017: Flight surveillance and service system of HNA General Aviation

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- 三、应用情况 III. Application
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中电科特种飞机系统工程有限公司(CETC-SMA), 隶属于中国电科集团 (CETC), 专业从事**特种飞机、无人**机、**智慧低空**等系统的研发、生产和服务的军民融合国有高科技企业, 总部位于成都, 是中国电科通用航空核心发展平台和智慧低空总体单位。

CETCA-SMA, as a member of China Electronics Technology Group Corporation (CETC), our company is a high-tech enterprise specializing in R&D, production and service of products such as **special mission aircraft, UAS and intelligent low-altitude system**. It is based in Chengdu. The company is the core development platform of Intelligent low-altitude system and GA business of CETC.



DA42 MPP飞机



DA42改无人机



16KG混合布局无人机



低空监管与飞行服务系统



DA42 MPP飞机



120KG混合布局无人机



4轴系留无人机



低空飞行指挥与任务管理系统

服务低空开放，助力无人机发展

Serve for low-altitude opening and facilitate UAV development

谢谢

Thank You

中电科特种飞机系统工程有限公司
CETC Special Mission Aircraft System Engineering Co., Ltd.

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